

The Indian Veterinary Journal

(The Journal of The All-India Veterinary Association)

Vol. XXIV

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No. 1

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THE INDIAN VETERINARY JOURNAL

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JULY, 1947

No. 1

General Articles.

RACING JOINTS

BY

RAO BAHADUR R. SWAMINATHA AYYAR, B.A., G.M.V.C.,

Madras.

Among race horses in this country, a condition is very frequently met with which commonly goes by the name of Racing Joint. This condition does not appear to have been met with in any other country as no mention of it is found in any of the text books on Veterinary Surgery. MacGregor in this country is the only author who makes a reference to it in his book 'The Examination of horses for soundness' published as early as 1929. Even he makes only a casual mention of this condition and hence it is thought that the following note would interest the profession.

Racing joint is an apt and expressive term to denote the condition. It is found only amongst race horses and nearly 20 per cent of them are found affected with this condition. During a fairly extensive practice of over three decades, I have not met with this condition in any other type of horses. Even among race horses, it is found only in the fore-legs, either one or both, and never in the hind legs. The only other condition which bears a near semblance to it is the "Cab-horse disease", described by Dollar in his text book on Veterinary Surgery. It may be considered as the ring-bone of the fetlock joint and can be defined as an osteoperiostitis of the Metacarpo-suffraginal joint.

The condition starts early in the racing career of the animal. Animals between the ages of 3 and 5 are very susceptible to it. All breeds of horses—Australian, English and Indian breeds—get it, although the Arabs do not appear to develop it quite so frequently.

The predisposing factors are in the confirmation of the animal. Light and medium horses with upright pasterns are very prone to it; so also animals with contracted high heels.

The exciting factor is concussion. Horses are put into training at a very young age when the bones are yet in the formative stage. If the training is very gradual and judicious, and given on a fairly soft ground, then the concussion is not so seriously 'felt' and very little damage is done to the bones and ligaments. If, on the other hand, the training is injudiciously intensified on a hard ground then, as should be expected, the concussion is increasingly 'felt,' and the bones and ligaments are subjected to great stress and strain. The fetlock joints of the front limbs appear to take this jar in greater force than the other joints in the limbs.

The first thing that draws the attention of the trainer and the rider is the 'feeling gait', of the animal and the absence of a free action. If both the legs are affected, then the action becomes decidedly cramped and restrained giving the impression of a 'tied-in' shoulder. If only one limb is affected, lameness becomes perceptible. Examination shows a certain amount of warmth and tenderness over the fetlock region, particularly the anterior and antero-internal aspects. Manipulation of the joint is resented and it is kept 'eased' while the animal is at rest.

In the early stages, the fetlock joint shows a distinct puffiness which gradually leads to thickening and enlargement. In course of time which may extend to some months, the part becomes hardened with exostosis of varying extent.

The mobility of the joint gets gradually limited with the progress of the disease until finally ankylosis locks the joint.

In the initial sub-acute stage, the lameness is perceptible but intermittent. When the condition becomes chronic, as it invariably does, the animal starts lame, or stiff, as it is very often expressed, but after warming up, goes sound. In cases where callous formation has taken place and the part had become hardened, even the initial stiffness is not noticed. This improvement of the lameness after exercise has been a characteristic feature of the condition and it has been mainly responsible for many an affected animal being kept at work without adequate rest. All the same, in a good percentage of cases, the performance of the animal on the course is not affected and an animal with 'racing joint' continues to win races. This, however, does not last long and the animal falls off gradually. Then it becomes a profitless proposition to be kept on the track any longer. Off racing, such an animal has been used either as a hack or a hunter fairly satisfactorily for some years.

PHOTOS ILLUSTRATING RACING JOINT



Fig. 1
NORMAL LEG

Fig. 2
AFFECTED LEG

METACARPO—SUFFRAGINAL JOINT

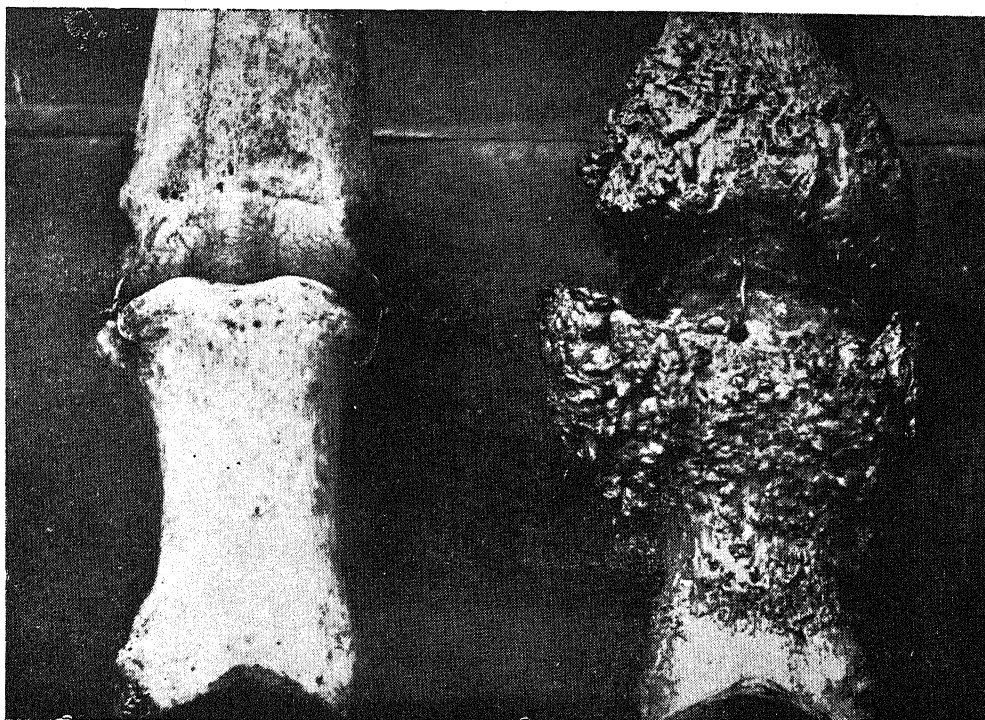


Fig. 3
NORMAL

Fig. 4
RACING JOINT

The anatomical changes that take place in the joint are practically akin to those found in cases of ring bones. Consequent on concussion, there is periostitis and ostitis of the Metacarpus and suffraginis bones. The strain on the metacarpo-suffraginal joint leads to a certain amount of sprain of the ligaments of the joint. The ensuing inflammatory exudate gradually gets organised resulting in osseous formation around the joint. The osseous formations, though more prominent on the anterior and antero-internal aspect of the joint, are found all round the joint to a varying extent. The articular surfaces of both metacarpas and suffraginis bones have invariably been found to be intact and the deposits of the bone have been only peri-articular. A few cases have been noticed where the new osseous deposits have been so big and prominent as to be frequently struck by the other leg.

The treatment of this condition has been on the lines indicated for Ring bone, viz rest, hot and cold applications, blister with or without firing and absorbents. But the results have been very unsatisfactory. The main reason for this has been the difficulty, as explained already, of enforcing the required amount of rest for the animal.

It need hardly be said that, from a soundness point of view, the condition is a definite unsoundness.

The enclosed photos for which, I am very grateful to Sri K. S. Nair, the principal of the Madras Veterinary College illustrate the condition in a living animal as well as on Post-mortem.

SOME RECENT DEVELOPMENTS IN ARTIFICIAL INSEMINATION OF CATTLE.*

BY

K. P. CHANDRASEKHARAN NAIR, B.V.Sc.

Madras Veterinary College.

Artificial insemination as an aid to livestock breeding has made rapid progress in recent years in Russia, America and Denmark. Researches in the technique and semen preservation, essentially by Russian and American workers, have made possible wide application of this method to livestock breeding. The extent to which artificial insemination is made use of in different countries depends mainly on the quality of available sires and the realisation of its genetic and economic possibilities. In Russia, the acute shortage of bulls and the need for rapid improvement of livestock, are responsible for the wide application of this method to livestock breeding. Aggregation of stock on collective farm, greatly aided the application

(*Read at the Provincial Conference of Madras Veterinary Association in September, 1946).

of this method in U.S.S.R. In 1938 according to Neumann (1939) 1.2 million cows were artificially inseminated. But the outbreak of war has greatly impeded the progress of artificial insemination in that country as shown by the figures given by Milovanov (1945). He reports that in 1944 there were 4160 inseminating stations dealing with 3.3. millions of sheep and 2,30,000 cows, representing fivefold decrease compared with 1940. In America and Denmark artificial insemination is employed chiefly for exploiting to the full the use of proven sires for improving dairy cows. In America, the first artificial insemination Association was started in 1938 and since then rapid progress in this field has been noted. Edwards and Richie (1944), state that in March 1943, there were 93 artificial insemination Societies in U.S.A, dealing with 182,524 cows and 574 bulls and the Societies provide service four times the 35 year-old Bull Association movement. In Denmark, since the starting of artificial insemination in 1936, a steady progress has been maintained. In 1944 there were 96 associations inseminating 343,000 cows which represents about one-fourth of the whole cattle population of the country. In England the start was made rather late, the first centre being opened in 1942, but since then a steady progress has been maintained, as shown by the fact that in 1945 there were nine centres for artificial insemination. This steady progress in artificial insemination all over the world shows the growing confidence of the dairy industry in this type of breeding.

Technique.—For semen collection artificial vagina is still the best instrument, though of recent years certain modifications have been introduced by various workers. The original Russian model consists of a thick rubber cylinder fitted with an inner rubber tube of 'latex' type, the ends of which are turned over the ends of the cylinder. At one end of the rubber cylinder there is an inlet for allowing water at the required temperature into the jacket formed by the outer hose and the inner rubber tube. The semen collecting cup is attached to one of the ends of the vagina. In the American model devised by Perry and Bartlett (1939) the semen collecting cup is replaced by a rubber cone with a small test tube. This has the advantage of using a much shorter artificial vagina and the bull ejaculates directly into the test tube, thus minimising the danger of contamination of the semen. Another type of artificial vagina has been described by Salisbury and Willete (1940) wherein care is taken to ensure that semen is not subjected to any variation in temperature at the time of collection. This type of artificial vagina consists of a water jacket long enough to extend over the test tube which is held at the temperature of the water. It is made from a 28" length of auto-radiator hose $2\frac{1}{4}$ " in diameter and two pieces of 3" flat rubber band tubing. The water jacket is made on the lines of the conventional type, but in addition a second inner lining is used which is tapered at one end by cutting out a V-shaped piece and cementing the edges together leaving an opening just enough to

accommodate a small test tube for semen collection. The larger end of the rubber sleeve is doubled back over the end of the water jacket. Additional advantages of using this type of artificial vagina are that it gives effective cushioning owing to double inner liner and that no heed need be paid to the water pressure. Raoult (1944) advocates the use of a double walled semen cup to prevent chilling of spermatozoa at the time of collection. In actual insemination, the Russian workers still make use of the speculum, whereas in America and England almost universally the use of speculum has been dispensed with for insemination. In the latter method, the cervix of the uterus is grasped by the left hand passed through the rectum, and a glass pipette, introduced through the vagina, is passed into the cervix and the semen slowly injected. A straight glass capillary tube holding a little over 1 c. c. of fluid and an all-glass 2 c. c. syringe is used. The syringe is connected to the capillary tube by means of rubber connection and at the time of insemination, the diluted semen is drawn only into the glass tube and does not come in contact with the rubber connection and glass syringe. Thus the syringe could be used over and over again, whereas a fresh pipette is used for every cow. This method, though difficult for the beginner, has many advantages. The operation is finished quickly with minimum of instruments. There is little chance of semen flowing back into the vagina as often happens in the case of the method with speculum. Further, since for every cow a fresh sterile pipette is used, there is no chance of spreading infection by means of the inseminating instruments.

Semen dilution.—In the field of semen dilution, great progress has been made in recent years. Dilutors are generally divided into two classes; those that act as dilutors only and those in addition serve to prolong the sperm life. The dilutors of the first class prove their worth only if insemination is performed within a few hours of dilution. The dilutors of the second class could in addition be used for preservation of semen. Dilutors are used mainly to increase the volume of the ejaculate, so that larger number of females could be inseminated from one sample. Milovanov (1933, 1934) considers that the evaluation of dilutor should not be based merely on the time of survival of spermatozoa at some arbitrary degree of dilution, as is commonly held. He holds the view that the evaluation should be based on the optimum and the maximum degrees of dilution, since the adverse effect of certain chemicals in the dilutions are not apparent until a high degree of dilution is reached. He states that the ordinary physiological solution such as Ringers, Locke's Tyrode's etc., in spite of views to the contrary, are not suitable as dilutors. These physiological salt solutions as well as accessory gland secretions exert a deleterious action on the mammalian sperm capsules and as such obviously they cannot in any way serve as good dilutors for semen and the only approach to this problem is to be found in the study of the characteristics of the sperms themselves. Of the

various dilutors described by workers, the common ones in use are the sulphate, the tartarate and the citrate. Gelatinised diluents are also found to be satisfactory.

The sulphate and tartarate diluents contain sodium sulphate and potassium-sodium tartarate respectively with glucose peptone and distilled water. The concentration of the chemicals varies with the species involved. By far the most satisfactory diluting fluid for bull semen is the egg-yolk phosphate buffer described by Lardy and Phillips (1939). It consists of 0.2 gm of K_2HPO_4 , 2.0 gm of Na_2HPO_4 , 12 H₂O and 100 c. c. of distilled water and equal quantity of fresh egg-yolk. One great disadvantage with this otherwise excellent dilutor is the presence of fat globules which interfere with the proper examination of sperms under microscope. To overcome this short-coming Salisbury and co-workers (1941) introduced the egg-yolk citrate dilutor. This medium consists of equal parts of egg-yolk and a M/15 solution of Sodium citrate which has the property of clearing the yolk and thus facilitating easy observation of individual spermatozoa under the microscope. At present egg-yolk phosphate and citrate are the two dilutors in general use. Very recently Mayer and Lasley (1945) have succeeded in isolating a fraction of the egg-yolk that increased the resistance of the sperm to 'cold shock'. In the light of this finding, it is possible to expect a highly efficient dilutor if further work is done in this direction. Knoop (1941) using a gelatin contain dilutor has shown its great superiority over the non-gelatinised dilutor. Milovanov (1938) has also investigated fully the use of gelatinised diluents. He made use of glucose-phosphate and glucose-sulphate diluents to which certain amount of gelatin has been dissolved, giving on setting a jelly-like consistency.

Rate of Dilution:—The common range of dilution is 1: 4 to 1: 10. It is important that the ratio between the semen and the dilutor is not less than 1: 3, as in lesser dilution, the semen is not properly buffered. Recent work of Salisbury and co-workers (1945) shows that semen could be diluted much more than hitherto thought of. They found no significant difference in fertility of samples at dilution rates of one part of semen to 8, 12, 16, 24 and 50 parts of egg-yolk citrate buffer. The total number of inseminations involved in this experiment is 3296 inseminations. This only proves to show that total number of females that can be inseminated without impairing the fertility of the bull is very large and require further investigation.

Preservation and Transport of Semen.—Enormous amount of work has been done in recent years on this aspect of artificial insemination. Elaboration of methods for conservation of sperm life is the the chief problem in the development of artificial insemination. Milovanov (loc.cit) states that the death of the sperm outside the body is due to three causes.—(1) destruction of the spermatozoon itself, (2) expenditure of nutritive

materials and (3) auto-intoxication of metabolic products. The cells undergo senescence and their resistance decreases; glycolysis occurs with decrease of glucose, accumulation of lactic acid and there is intake of oxygen and formation of Carbon-di-oxide). Storage of semen involves the bringing of the sperms into a reversible state of activity, to slow down metabolic processes and delay senescence. Since sperm in that state, termed 'anabiotic state' by Milovanov, is still living, it is necessary to ensure supply of energy material and to render the metabolic products harmless. Conditions in the epididymus are most favourable for sperm life and Milavanov (loc. cit) is of opinion that the aim in storage is to reproduce in vitro the anabiotic conditions prevailing in the epididymus. Obviously it is easier with rams and bulls semen in which epididymal contents at the time of collection are slight compared with the semen of boar, stallion and dog. In general, storage of semen depends on (1) gradual cooling to the temperature at which its functional activity is reduced to a low, in a but in a reversible state (2) addition to semen of various substances which supply nutrients and control to some extent metabolic reaction and (3) removal of accessory secretion and concentration of semen. A layer of medicinal paraffin oil recommended by Walton (1933) is probably to reduce gaseous exchange to the minimum and to help the retention of CO_2 which in turn helps to keep the medium from becoming unfavourably alkaline. For storage it is important to see that only good semen samples are used. Herman and Swanson (1941) observed that generally speaking the initial motility gave an indication of storage potentialities. The storage temperature rate of cooling and dilutor used for preservation are all factors, which influence motility of the spermatozoa on storage. Rapid cooling causes what is called "Cold shock" and might lead to death of the spermatozoa and very slow cooling causes death of the spermatozoa from auto-intoxication. The optimum storage temperature is affected by rate of cooling and time of exposure. It is generally agreed that the optimum storage temperature of bulls semen is $5^{\circ}C$, although many workers have given a much lower optimum storage temperature. Willett and co-workers (1940) found a rate of cooling of $5^{\circ}C$ per 5 minutes to a storage temperature $5^{\circ}C$ most satisfactory for bull's semen. Undoubtedly, the best preservative for storage is the egg-yolk phosphate or egg-yolk citrate dilutor. For storage, the reduction to temperature of $15^{\circ}C$ could be done rapidly, but further cooling to storage temperature must be done slowly. Rawson (loc.cit) found that the addition of egg-yolk phosphate would accomplish the rapid cooling of semen to the storage temperature of $5^{\circ}C$ without injuring the sperms. Gradual warming of the semen before use is not necessary as was once thought.

For storage and transport of bull-semen, Waltan (1942) advocates the use of Vacuum collecting flask to prevent rapid cooling. The flask with the semen is placed in a series of cooling chambers of thermos jars at

15°C and 10°C 5°C for half an hour and one hour respectively. The semen is transferred to stoppered test tubes and stored or transported in thermo flasks with ice. For short distance transport the method devised by Salisbury (1943) is very satisfactory. Here semen vials are properly cooled to 40° F, labelled and wrapped in several layers of ordinary paper. The vial is next placed along with a toy balloon of solid ice.. The two are then wrapped together in heavy insulating paper and package inserted into a thick card-board box surrounded inside by two layers of corrugated card board. For long distance transport Swanson and Herman (1944) have improvised the commonly used ice-cream shipping package. It is provided with ground cork as insulating material and a gallon can be accommodated inside this. The cooled semen vials are well-wrapped in finger stalls and inserted into $\frac{1}{2}$ pint thermos bottles with water at 40°F. Small pieces of 'excelsior' are placed at the bottom of the thermos to prevent wobbling of the vials in transport. Cracked ice is packed all around the thermos and for extra refrigeration a small column of lime is kept at the top of the can. This type of shipper was found to maintain a temperature of not less than 50° F. for 84 hours.

Evaluation of semen quality.—The best and infallible criterion of fertility of the sperm is the actual breeding result which unfortunately takes at least over 9 months. Meanwhile in the actual working of the artificial insemination units, it is essential to assess the potential fertility of Semen samples. In spite of considerable amount of research in this direction, no single quick and reliable test closely related to fertility has yet been described. The following points should be included in the examination.—(1) appearance, (2) volume, (3) motility, (4) sperm density, (5) pH of the semen and pH after incubation, (6) proportion of abnormal spermatozoa (7) respiration rate of spermatozoa and methylene blue reduction time, (8) longevity of sperm under storage condition, (9) freedom from bacteria, parasites and cells. The examination should be made as complete as possible and if the bull is used intensively the examination should be periodically done. Since variations exist between different ejaculates of the same bull, the evaluation for fertility of the bull could be done only after study of a good number of samples. Besides periodic clinical examination of the genital organs should be made.

On an average a bull gives about 5 c.c. of semen per ejaculate. When bulls are in regular use, the volume of the second ejaculate is usually greater than the first. The colour and thickness vary with the concentration of the semen; the higher the concentration the whiter or more creamy or thicker the semen. Examination of the semen for motility should be done immediately after collection on a warm stage. Of the various types of motility exhibited, the progressive type is most important in semen

evaluation. The method of estimating motility consists of some arbitrary scale for denoting and the proportion of sperms exhibiting it. Thus the relative number of sperms showing progressive movement may be expressed as percentage or in fifths or tenths of the total number of spermatozoa.

The bull semen on an average contains 1,000,000 cells per m. m. Generally speaking fertility increases with the sperm density. Usually a haemocytometer or a photo-electric colorimeter is used for accurate measurement of sperms density. Recently Salisbury and associates (1943) and Kyaw (1944) have described a rapid method of estimating sperm density. The method consists of making use of opacity tubes on the lines of estimation of the concentration of bacteria in suspension. Though the method is less accurate, it is quick and sufficiently accurate to estimate the density of the sperm at the time of insemination. The pH of semen is found to have some bearing on the motility and concentration of semen. In general according to Anderson (1945) semen of good bulls are slightly acidic; of infertile bulls slightly alkaline, probably due to increased accessory secretion in the latter case. Alkalinity of semen is associated with decrease in sperm activity and density. In general the pH of good semen sample varies from 6.5 to 6.8. Anderson (1944) has noted a significant relationship between pH change on incubation at 37° C. and other characteristics of semen. He found that the greater the initial motility and sperm density and the lower the initial pH, the greater the decrease on incubation. This was found true in general although there were some exception to this, but however it was suggested that determination of the initial pH and the pH change of incubation at 37° C may prove a valuable method of evaluating semen.

Sperm abnormality is invariably present in almost all the semen samples and most workers consider that semen containing anything more than 20% of abnormal forms as evidence of pathological conditions of testicles—Sperm abnormality may be due to faulty spermatogenesis or due to change in the sperm after full formation. The latter is easy to rectify, but not the former.

Measurement of metabolic rates are among the most reliable tests that indicate the quality of the semen. Edwards and Walton (1938) noted that there is a definite relationship between the number of services per conception and the respiratory rate of bull semen. They found that in case bulls do less services for conception, the average initial respiration rate of semen is much greater. Ely (1942) found higher oxygen consumption in ejaculates that keeps longer on storage. A simple and rapid method of measuring metabolic rate has been described by Beck and Salisbury (1943). They have noted significant correlation between the methylene blue reduction time and sperm density and duration of motility on storage.

It was found that good semen samples decolourise methylene blue in shorter time and *vice-versa*.

Another property of semen most nearly correlated with bull fertility is the time of survival of vigorous motility under storage conditions. This relationship is to be reasonably expected because time is consumed in the journey of the spermatozoa to fallopian tube and in the release of the ovum and only those spermatozoa that are alive and vigorous after such time have a chance of fertilising the ovum. According to Herman and Swanson (1941, 1944) semen from a bull of good quality should show a high percentage of vigorous motility for at least 30 hours, on storage at 40° F. in an undiluted state.

From the above, it is clear that for evaluating semen no single test is of much value, and the judgment should be based on the maximum number of tests, the most important and simple being sperm motility, motility on storage and methylene blue reduction test.

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SCHISTOSOMIASIS AMONG SHEEP/GOATS IN POONA R. I. A. S. C., BUTCHERY.

BY

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Schistozomes seem to be fairly common in sheep/goats of Marwar, Rajputana. From 20th January to 28 February 1947 approximately 8,948 sheep/goats have been slaughtered in this butchery. Out of these, about 2,000 animals appear to have arrived from Marwar. Of these again as many as 926 Livers have been condemned as being Cirrhotic. Schistosomes have been detected in 436 Livers slaughtered and as many as 92 Livers were affected with Schistosomes.

Owing to the severity of Liver infections and also because a sister species of the Schistosome viz. *Schistosoma haematobium* has been reported in human beings, it may not be out of place to mention further details on this subject.

Contrary to the usual opinion that a blood sucking parasite causes anaemia with accompanying loss of weight, etc., the affected sheep appears to be well fed and in good condition, but the goats are markedly anaemic and are very poor in body weight. The carcasses of these latter animals are usually emaciated.

In severe infections the Liver undergoes complete degenerative processes, with extensive manifestation of chronic inflammation of the entire Liver tissue. A section of such a Liver on microscopical examination revealed "Generalised cloudy swelling with a few areas of early necrosis". It is easy to pick up a Liver thus affected. It appears enlarged and presents an uneven surface; is lumpy, lustreless and feels firm to touch. The edges are rounded. In less severe cases the edges are serrated and are dark brown in colour. In still less severe infections, however, the Liver appears normal in colour and consistency. One can easily miss the detection of parasites in such a liver when the carcass is cold.

If a severely affected liver is incised one cannot miss the fibrous thickening of the hepatic vessels. The important predilection seat appears to be the portal veins. The parasites are also detected in hepatic veins and Mesenteric veins. A search was also made for the same in kidneys and lungs without any success. If, in a freshly slaughtered animal, the liver is incised at the 'Porta', close inspection will not fail to reveal the presence of these parasites. In some cases they are found in clusters and can be brought into sight by pressing the liver at the entrance of these vessels into the substance of liver. In a cooled carcass, where animals are slaughtered one or two hours before inspection, these parasites are found entangled in blood clots in these veins. If such a clot is teased in normal saline solution, in most cases living parasites are liberated which can be examined under low power. The parasites have been identified as "*Schistosoma indicum*".

Conclusion:—1. *Schistosoma indica* has been found extensively in the animals slaughtered in the Poona R. I. A. S. C. Butchery. Though the liver is severely affected, the condition of the host, particularly sheep, is not affected to a great extent. Goats, however, show severe anaemia. This is a very interesting feature to note.

2. Though animals from Marwar (Rajputana) seem to be grossly infected, sheep and goats of Bombay Presidency are not entirely free of this parasite.

3: It is considered important in Meat Inspection as a sister species (*S. haematobium*) has been recorded in human beings.

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Reference :

H.O. Monniß—Veterinary Helminthology and Entomology.

**THE BLOOD-GROUP IDENTIFICATIONS OF VARIOUS
INDIAN BREEDS OF CATTLE IN INDIA ***

BY

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Since the inception of organized thought, it has been known that no two individuals are alike; hence have originated the systems of classification based on these differences. Morphological characteristics have formed the basis for classification into groups of similar animals or species and in each species the differences of lesser degree, such as body contour and other qualities, have brought further subdivisions into breeds. The problem of the identification of various breeds of Indian cattle has recently been receiving much attention [Olver, 1938; Ware, 1939, 1941]. Ware recognizes 28 breeds of Indian cattle belonging to five main groups. This classification, as with other animals, has been carried out on the basis of morphological characteristics alone. The work detailed in this and a previous article [Singh, 1942] represents an attempt to approach the problem from another angle and to supplement the morphological findings by serological features with the special object of elucidating the origin and evolutionary relationship of the breeds.

The group classification of Indian cattle has been provisionally fixed after Little [1929] on an international basis with certain modifications, as follows.

Group 1 (International O). Serum agglutinative, cells not agglutinable; that is, cells with O isogen and ab isonin.

Group 2 (International A and B mixed). Serum agglutinative, cells agglutinable; that is cells with A isogen and B isonin or cells with B isogen and A isonin.

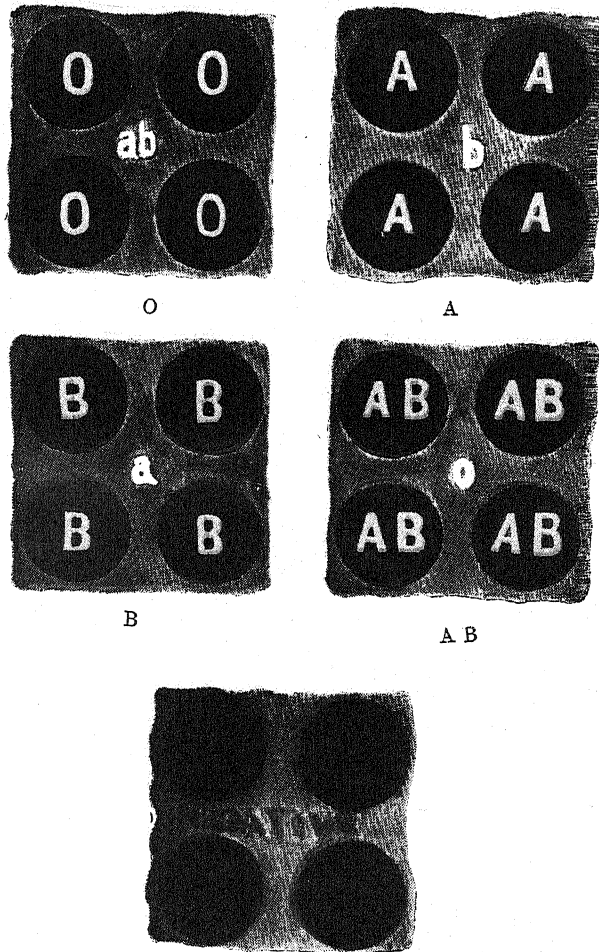
* *Indian Journal of Veterinary Science and Animal Husbandry*, Vol. XV, Part II.

Group 3 (International AB). Serum not agglutinative, cells agglutinable; that is cells with isogen O or AB and serum without isonins.

Group 4 (Negative or N). Serum not agglutinative, cells not agglutinable. (In this group are included all cattle that have shown no reaction with the present method of testing).

In the previous article [Singh, 1942] some account was given of attempts that have been made to define the blood-groups of domesticated animals. In this paper a few examples are given to show how by blood-grouping the origin of certain races of mankind may be discovered.

Parr [1929] provides data by which Armenians, Arabic Muslims and Arabic Christians can be assigned their racial indices. Goodner [1930] in tests on 223 pure Mayas and 202 Mayas with mixed Spanish blood in Mexico found practically all of the former to belong to group O, and in this way was able to differentiate pure Mayas from those of mixed blood. Shanklin [1935] found Rwala Arabs to have a high percentage of group O, and on this account he suggests that these Arabs are related to American Indians, who have a similar blood-grouping. Postmus [1934] found that type N was more frequent among the indigenous people in Netherland Indies than among Europeans. Edward *et al.* [1941] studied the racial distribution of blood-groups among Papags Indians in Arizona (U.S.A.). Out of 600 individuals examined 93.8 per cent were of group O while only 6.17 per cent were group A and groups AB and B were absent. The authors conclude that a high incidence of group O and the absence of groups AB and B suggest racial purity. Elsdon Dew [1939] in a blood grouping expedition in East Africa tested individuals of 46 tribes, and found groups A and B only. He interprets the distribution on the basis of mutation and suggests that the Bantu does not descend from the Negro but is rather a pure example of the common stock. An Egyptian origin is suggested for Hottentots. Thomas [1939] reports on blood-group distribution in England. Out of 5,000 people, 2,233 were of group O, 2,162 of A, 444 of B and 161 of AB group. Haldane [1940] studied the blood-group frequencies of 75 European population groups. A striking variation was discovered in the frequencies of A and O groups, among the peripheral population of Western Europe, there being a low proportion of group B in Scandinavia, Iceland, Spain, Portugal, Sardinia and the British Isles. Populations with low B are regarded as remnants of a primitive European civilization. In India, Malone and Laheri [1929] studied three types of people, (1) Turko-Iranians, (2) Indo-Aryans and (3) Dravidians. They confirm the findings of Hirschfeld in concluding that these people are characterized by a high incidence of group B. The Dravidians are also characterized by a high incidence of group A. Macfarlane [1938] studied the blood-group distribution in Bengal. Data from lower Bengal show



The Blood-group Identifications of various
Indian Breeds of Cattle in India.

that the frequency of groups A and B increases as one passes from higher to lower castes, the highest frequency of group O being found among caste Hindus. Bengalee depressed classes have the highest percentage of group B so far found in India. Bengalee-Muslims have a blood-group distribution similar to that of their low-class Hindu neighbours. Macfarlane [1940] also studied the problem in Bastar State and found a high frequency of group B among the Bhils, this being regarded as due to in-breeding. Almost all the Chenchus of Bastar State belonged to groups O and A and in this respect resemble the hill tribes of the Western Ghats and the Malyali lower castes, so sharing the distinction of being the only Indian tribe with more group A than B, Sarkar [1940], in 96 tests on certain primitive people of India, Huyani nagas (Assam and Bihar), showed the predominance of group A over B, excepting among the Thado-Kukis. Greval and Chandra [1940] tested Hindus, Muslims and Anglo-Indians of Calcutta. A high frequency of groups O and B was found in Hindus and Muslims, whereas group A was the highest and B the lowest among the Anglo-Indians. Sheshadhari-Nathan and Timothy [1942] carried out a similar investigation in Madras. Group O was the highest and B lowest among the Anglo-Indians. Pandit [1934] found a high frequency of group B among Todas (Guindy, Madras).

The technique used in the blood-grouping tests was the same as that described in the author's previous articles [Singh, 1942]. It consisted of mixing in a small tube about four drops of serum and an equal amount of 2 per cent washed red cell suspension, gently mixing and exposing the mixture at 37°C. (dry incubator) for 30-60 minutes.

Cattle of the following breeds were selected for study: Kumauni (hill), Sindhi, Gir, Sahiwal, Tharparkar, Hariana, Kankrej, Amritmahal, Kanayam, Ongole, Dhanni, Afghar and Friesian. The distribution and location of these breeds can be seen in Fig. 1 from which it is evident that they are subject to a wide range of climatic and other environmental factors.

In this work there are three main sources of difficulty: (a) the low and quickly deteriorating titre of the serum. (This difficulty does not arise in blood-group work with human sera, which with cold storage can be used for some days), (b) the necessity of carrying out the tests at 37°C. and (c) the number of antigenic components in the erythrocytes of cattle. The location of some of the cattle in places where there are special transport difficulties was an additional hindrance. For these reasons the results recorded here are not as detailed as might be desired and the object has rather been to determine certain broad facts regarding the blood affinities.

The usual practice was to bleed 12 animals in the morning, test the 144 combinations of serum and cells, and read the results the same evening.

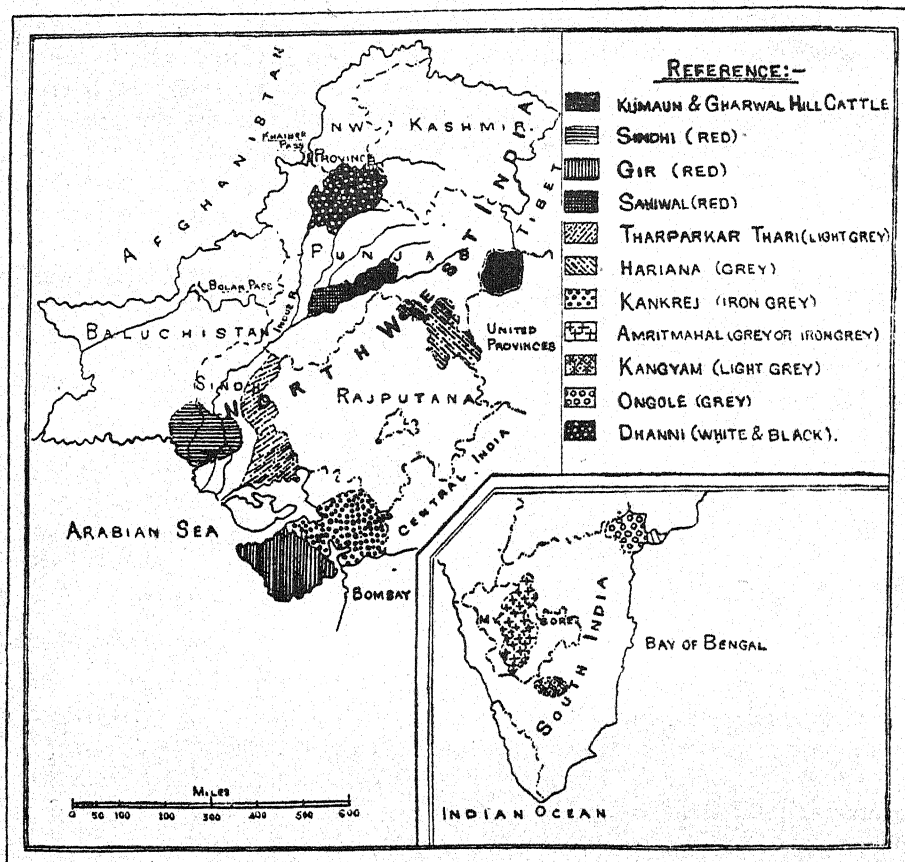


FIG. 1. Map showing the location of various cattle breeds in India.

The results largely depended on the particular antigenic components present in the blood of individuals of the group tested on one day. Occasionally, cells and serum from an animal found to be a good reactor on the previous day were included, in order to increase the chances of obtaining positive reactions. The reason for this is that a few cattle, giving no reactions with serum and cells from one lot of animals, may exhibit positive reactions with isogen or isonin * or with both these components when tested with serum and cells from another lot. In this way the group classification first recorded had to be altered after a further test, though this was not frequent.

RESULTS

The results of the tests will be found in Tables I-V and in Fig. 2.

* Isohaemagglutinins and Isohaemagglutinogens will be termed isonins and isogens, after Greval *et al* [1941].

1. *Kumauni hill cattle*. The home of this breed is the Kumaun foot-hills of the Himalaya. It is one of the smallest breeds of Indian cattle with short horns and a thoracic musculo-fatty hump. The poll and hump are usually covered with coarse hairs; the sheath is tight and the legs are short, thick and bony. The colour is generally deep-red or jet-black, and an admixture with white is regarded as indicating crossing with grey cattle of the plains.

The experiments were conducted at Mukteswar, where many pure Kumauni cattle are available. The animals were collected from various Kumauni hills and may therefore be regarded as of divergent strains.

In order to differentiate A and B groups, 24 of the reactors were selected and their isonins were cross-tested with their isogens. The results are given in Table I.

According to the reaction found in these tests, 13 animals were classified as groups A and B mixed. Of these, 12 animals (1, 2, 3, 5, 6, 7, 8, 12, 17, 20, 21 and 23) were then selected and their isonins and isogens cross-tested. The results, given in Table II, indicate eight animals belonging to A group and four to B group.

It is also noticed that the animals of both groups showed reactions against animals of their respective groups, thus suggesting the presence of sub-groups or several antigenic components of cattle cells. The problem was further studied by an absorption test conducted in the following way.

Equal quantities of packed cells from group A animals and serum from group B, and *vice versa*, were well mixed in a tube, left at room temperature for 30 minutes, then at 37°C. for an hour and finally at room temperature for 30 minutes. Since the serum titre was found to be very low, the amount of serum was subsequently increased to two, four and nine times the volume of packed cells. From this it was found that the optimal ratio for complete absorption of homologous isonins was 1 : 5. By absorption tests the following distribution of groups was found.

Groups				Hill bulls
A	...	...	...	1, 6, 7, 20.
A ₁	...	...	...	5.
A ₂	...	...	...	17, 23.
A ₃	...	...	...	8.
B	...	...	...	2.
B ₁	...	...	...	3, 12.
B ₂	...	...	...	21.

Thus in Kumauni hill cattle the ratio of groups A to B appears to be as 2 : 1.

TABLE I

Blood-grouping of Kumaun hill cattle on 24 previously reacting bulls

SERUM FROM HILL BULL

Cells from hill bull	LOT I												LOT II												Provisional Grouping
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	—	±	+	—	+	—	—	+	—	—	—	+	—	—	+	—	+	—	—	—	±	—	+	—	A & B
2	+	—	+	—	+	±	+	+	—	—	—	—	—	—	+	—	+	—	—	±	+F	—	+	—	A & B
3	±	—	—	—	+	—	±	+	—	—	—	—	—	—	+	—	±	—	—	—	—	—	±	—	A & B
4	±	—	+	—	+	±	—	+	—	—	—	—	—	—	+	—	+	—	—	—	+	—	+	—	AB
5	—	+F	+	—	—	—	—	—	—	—	—	—	—	—	+	—	+	—	—	—	+F	—	+	—	A & B
6	—	+F	—	—	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A & B
7	—	+F	+	—	—	—	—	+	—	—	—	+	—	—	+	—	—	—	—	—	±	—	+	—	A & B
8	—	+F	—	—	+	—	±	—	—	—	—	—	—	—	—	—	—	—	—	±	—	—	—	—	A & B
9	+F	+F	+	—	+	+	+	+	—	—	—	—	—	—	+	—	+	—	—	+	—	—	+	—	AB
10	—	+F	—	—	+	+	+	+	—	—	—	—	—	—	+	—	+	—	—	+	—	—	+	—	AB
11	±	—	—	—	±	±	+	+	—	—	—	+	—	—	+	—	±	—	—	±	—	—	+	—	AB
12	±	+F	—	—	+	+	+	+	—	—	—	—	—	—	+	—	±	—	—	±	—	—	+	—	A & B

Lot I

Lot II

Inoculation of isogen and isonin of lot I was done on 29 July 1942 (isogen isonin fresh).

Inoculation of isogen of lot I and isonin of lot II was done on 30 July 1942 (isogen 24 hour old in cold and isonin fresh).

Inoculation of isogen and isonin of lot I was done on 31 July 1942 (isogen isonin fresh).

Inoculation of isogen of lot II and isonin of lot I was done on 1 August 1942 (isogen 24 hour old in cold and isonin fresh).

The result of the tests was as before, except that with Nos. 15, 17 and 23, the grouping⁸ was previously recorded as 0

TABLE II

Analysis of bloods with A and B mixed groupings selected from Table I

(1) Iso-gen from hill bull	(2) Isonin from												(3) Grouping
	1	2	3	5	6	7	8	12	17	20	21	23	
1	—	±	+	+	—	—	±	+	+	—	+	+	A
2	+	—	+	+	±	+	+	—	+	±	+	+	B
3	±	—	—	+	—	±	+	—	±	—	—	±	B ₁
5	—	+	+	—	—	—	—	—	—	—	—	—	A ₁
6	—	+	—	+	—	—	—	—	—	—	—	—	A
7	—	+	+	—	—	—	+	+	+	—	±	+	A
8	—	+	—	+	—	+	—	—	—	±	—	—	A ₃
12	±	+	—	+	+	+	+	—	±	±	—	+	B ₁
17	—	+	—	+	—	—	+	+	—	—	—	—	A ₂
20	—	—	+	+	—	—	—	—	+	—	—	+	A
21	+	—	+	+	±	+	+	—	+	—	—	+	B ₂
23	—	—	—	+	—	—	±	+	—	—	—	—	A ₂

2. *Red Sindhi*. The home of this breed is the province of Sind about Karachi, Hyderabad, the coastal line and the Indus river banks, including the Las Bela areas of Baluchistan. The animals are of red or fawn colour, frequently with some white on the face and dewlap. They are among the best milch type cattle of India and the bullocks are useful for draught. The animals are short-horned.

The tests were made in January and February, 1942 on 96 cattle (92 cows, 4 bulls) at the Imperial Dairy Institute, Bangalore, where a suitable herd of Sindhi cattle is maintained. It is a self-contained herd and the

animals are therefore regarded as inbred for the purpose of this study. The results obtained with this and most of the other breeds are given in Table III.

3. *Gir*. The home of this breed is the Gir forest in Junagadh State (Kathiawar), where these cattle are found in a pure state. The breed is also spread over a large part of Bombay either pure or crossed with local cattle. The animals have short horns. The colour is generally mottled-red or black and of various shades of these colours. In some strains the body is mainly white with red or black spots, but entire reds and blacks are also met with. The cows are generally good milkers but the bulls are slow and lethargic in work. The Gir is reported to be the best beef animal in India.

The blood group investigations were also carried out at the Imperial Dairy Institute, Bangalore, where a small herd of these cattle is maintained and at the Palace Dairies of Bhavanagar and Junagadh States. Most of the animals were farm-bred and may therefore be regarded as inbred for our purposes.

4. *Sahiwal*. These are essentially milch cattle and are generally raised in large numbers in the dry central and southern areas of the Punjab. They are long, deep, rather fleshy cattle, short on the leg, comparatively lethargic and heavily built, with fine skin, especially in heavy milking strains. The bullocks are not good for draught. They are short-horned. The colour is red but some are dun. Investigations were carried out at Jahanjirabad Farm (Multan). The animals were mostly farm-bred and are therefore, regarded as inbred.

5. *Tharparker*. The home of these cattle is in the arid, semi-desert tracts of south-west Sind, but they are also bred in the adjoining Indian States of Kutch, Jodhpore and Jaisalmer. They are medium-sized animals, the cows have good milking capacity while the bullocks are good workers. They are lyre-horned and have straight limbs and hard feet. The colour is entire grey or light red in young bulls, while in cows and bullocks it is generally lighter grey. The colour tends to become white with age.

The investigations were conducted on a total of 96 animals at the Agricultural College Farm, Sakrand and at the Agricultural Farm, Lundo (Nawabshah Distt.), Sind. The animals in these farms had been recently purchased from various sources and may therefore, for the purpose of this study, be regarded as of divergent strain.

6. *Hariana*. The home of this breed is in the Rohtak, Hissar, Karnal and Gurgaon districts of the Punjab and in Delhi province. *Hariana*

TABLE III
Combined table of the 12 Indian and Afghan Breeds of Cattle

Serial No.	Name of breed	Grouping of Ware [1941]	No. of animals tested	O	Distribution of groups		Negative
					A & B	AB	
1	Kumani (hill)	...	108	—	40 (37.04)	67 (62.04)	1 (0.92)
2	Sindhi (red)	...	96	36 (37.5)	7 (7.3)	47 (49.0)	6 (6.2)
3	Gir	...	120	50 (41.7)	5 (4.1)	50 (41.7)	15 (12.3)
4	Sahiwal	...	117	57 (48.7)	3 (2.6)	32 (27.4)	25 (24.3)
5	Tharparker	...	96	31 (32.3)	15 (15.6)	26 (27.1)	24 (25.0)
6	Hariana	...	132	16 (12.1)	4 (3.0)	34 (25.8)	78 (59.4)
7	Kankrej	...	120	27 (22.5)	3 (2.5)	25 (20.8)	65 (54.2)
8	Anrimahal	...	96	18 (18.8)	9 (9.4)	43 (44.8)	26 (27.0)
9	Kangayam	...	100	24 (24.0)	3 (3.0)	41 (41.0)	32 (32.2)
10	Ongole	...	96	18 (18.8)	2 (2.0)	24 (25.0)	52 (54.0)
11	Dhanni	...	99	36 (36.4)	8 (8.1)	36 (36.4)	19 (19.1)
12	Afghan	...	19	8 (42.1)	2 (10.5)	7 (36.9)	2 (10.5)
Total ...			1,199	321	101	432	345
Percentage ...			Percentage ...	26.8	8.4	36.0	28.8

NB.—Figures in brackets indicate percentages.

bullocks are powerful draught animals and are extremely useful for heavy ploughing and transport. The cows are fairly good milkers. They are short-horned cattle. The coat colour is white, a grey admixture being regarded as due to crossing with other breeds such as Kankrej.

The experiments were carried out at the Government Cattle Farm, Hissar, most of the animals tested being farm-bred and therefore to be regarded as inbred animals.

7. *Kankrej*. This breed resides in the country south east of Kutch, extending from the south east corner of the Tharparker districts of Sind to Ahmedabad in Bombay and from Deesa in the east to Radhanpur State in the west, particularly along the Banas and Saraswati rivers. They are fast and powerful draught cattle. In the past they have been exported to South America and other tropical countries in order to maintain the constitution of the local cattle by introduction of Zebu blood. The Kankrej has been said to be instrumental in the formation of beef breeds in these countries. They are lyre-horned cattle. Cows are fairly good milkers. The Kankrej is a thoroughly well established breed which has been maintained pure for generations. They carry the head in a raised position, hence the name 'Proud Kankrej'. The colour is generally grey to iron grey, growing white with age.

The blood-grouping experiments were conducted at the Northcote Cattle Farm at Chharodi. Most of the animals were farm-bred and may be regarded as inbred cattle for the purpose of this study.

8. *Amritmahal*. This is a breed of Mysore State, where the animals are bred under Government control and their sale usually restricted. Subsistence is entirely by forest grazing. They are among the best and fastest draught cattle in India, and are particularly useful for army transport.

They have long and pointed horns arising close together and extending backwards and upwards. They belong to Ware's group IV. The colour varies from light to deep iron-grey, with a darker almost black shade over the shoulders and hind quarters in the case of bulls. Bullocks and especially older ones appear white, while the cows are generally white or at times light grey. Calves at birth are mostly red or light-red.

The tests were carried out at the Cattle-Breeding Station, Ajjampur, Mysore State.

9. *Kançayam*. This is a breed of the south-eastern taluks of Coimbatore, Madras. Animals of this breed are bred on scientific lines at the Live-stock Research Station, Hosur. There is also a long-established herd

maintained by a private breeder, the Pattaḡar of Palayakottai. The breed is suitable for light plough and transport work and is economical to maintain. The cows are generally poor milkers. The horns arise fairly close together and extend slightly backwards and upwards. The colour is generally light-grey but changes to white with age. Bulls sometimes show iron-grey patches over the front and hind quarters. Calves when born are red but later change to light-grey colour.

One hundred adults were tested at Hosur. Most of them were farm-bred and are thus inbred for the purpose of this work.

10. *Onḡole*. The home of this breed is the Guntur district and neighbouring area of Madras. It is one of the large breeds of Indian cattle and greatly resembles the Haryana. The animals are, however, comparatively lethargic, and useful for heavy plough and transport work. The cows are fairly good milkers. They have short horns. In colour, they are mostly white but a small proportion are of a light grey colour. The bulls generally show a light shade of grey over the quarters. Ninety-six adults were tested at the Livestock Research Station, Guntur. Most of them were farm-bred and so inbred for our purposes.

11. *Dhanni*. This breed lives in the northern Punjab, in an area of undulating valleys at an average altitude of 1,500 feet. The climate is generally very cold during the winter and fairly hot in summer. It is a fast and light plough animal and fetches high prices. The cows are generally poor milkers. The horns are short. The coat colour of the body of the so-called pure Dhanni-bred animal is white with black spots, while the skin colour and tuft of the tail are invariably white. Ninety-nine animals were tested at Chakwal, Daulatala and Gujarkhan. As they had been collected from different sources, they may be regarded as of divergent strain.

12. *Friesian and Friesian-Sahiwal cross*. Tests on 86 animals were made at the Military Farms at Sialkot and Lahore. Some were pure-bred and recently imported from Europe, others were pure Friesians born in India. The remainder were crossed with Sahiwals. Results of the tests have been given in Table IV. The frequency of A and B groups in pure-bred Friesians is much higher than usual.

13. *Afḡhan*. The original home of this breed is Afghanistan. A few of these cattle were presented by the Afghan Government to H. E. the Viceroy and have since been kept at the Imperial Veterinary Research Institute, Mukteswar, where they have developed into a small herd. Nineteen cattle could be brought under experiment. The results are given in Table V.

TABLE IV
Grouping of Friesian and of Friesian-Sahival cross cattle

No. of ex- peri- ments	Date	No. of animals	Group I (O)	Group II (A&B)	Group III (AB)	Group IV (Neagative)	Remarks
1	11 April 1943	12	?	5	4	1	Friesian Friesian-cun Sahival
2	12 April 1943	13	2	4	2	5	... 1/2 2 3/4 39 5/8 1 7/8 12
3	13 April 1943	12	...	3	4	5	Do. Do. Do. Do.
4	14 April 1943	12	3	...	4	5	Do. Do. Do. Do.
5	17 April 1943	12	1	4	6	1	Do. Do. Do. Do.
6	17 April 1943	13	...	6	6	1	Do. Do. Do. Do.
7	18 April 1943	12	1	4	5	2	Do. Do. Do. Do.
	TOTAL	86	9	26	31	20	TOTAL
	Percentage		10.5	30.2	36	23.3	

TABLE V

Mukteswar—Blood-grouping of Afghan breed of cattle

Cells from	Age of animals (years)	Serum from											Group distribution	Remarks
		1	2	3	4	5	6	7	8	9	10	11		
Afghan Cow 1	7												A & B	
" " 2	6½	+	+	+	+	+	+	+	+	+	+	+	AB	
" " 3	5												O	
" " 4	5												O	
" " 5	4												O	
" " 6	5												O	
" " 7	5½	+	+	+	+	+	+	+	+	+	+	+	AB	
" " 8	6												O	
" " 9	6												O	
" " 10	6												O	
Afghan Bull 2	7	+	+	+	+	+	+	+	+	+	+	+	AB	
" Heifer 15	2½												O	
" " 14	2½	+	+	+									AB	
" Bull-calf 18	2½												Negative	
" " 17	2½												"	
" Cow 8	4	+	+	+									AB	
" Heifer 12	2½	+	+	+									AB	
" Calf 16	2½												O	
" Bull 1	5½	+	+	+									AB	
" Heifer 11	2½												A & B	

Percentage:—

Group O 42.1%

Group A & B 10.5%

Group AB 38.9%

Group Negative 10.5%

Discussion.

The value of blood-grouping for determining questions of heredity has been established by various workers. It has been found that in any race in the absence crossing the proportion of groups remains constant from one generation to another. By crossing, a definite change in the normal proportion of groups is brought about. Before discussing the results obtained in this study, it is worth while repeating Snyder's [1930] postulates on the subject, which are as follows:

1. Any people whose blood-group distribution is studied shows blood-group frequencies similar to those of other people known to be related to it.

2. If any people shows blood-group frequencies different from those based on the frequencies of peoples known to be related to it, the conclusion may be drawn that the former has undergone racial crossings which the latter have not undergone or *vice versa*.

3. If any people shows blood-group frequency similar to a group of people not known to be related to it the conclusion may be drawn that the former traces back to the latter somewhere in its ancestry or the former has undergone crossing with the latter group or some similar people.

4. If any people lacks one or both of the blood-group mutations as evidenced by an extremely low value of *p* or *g* it may be assumed that this

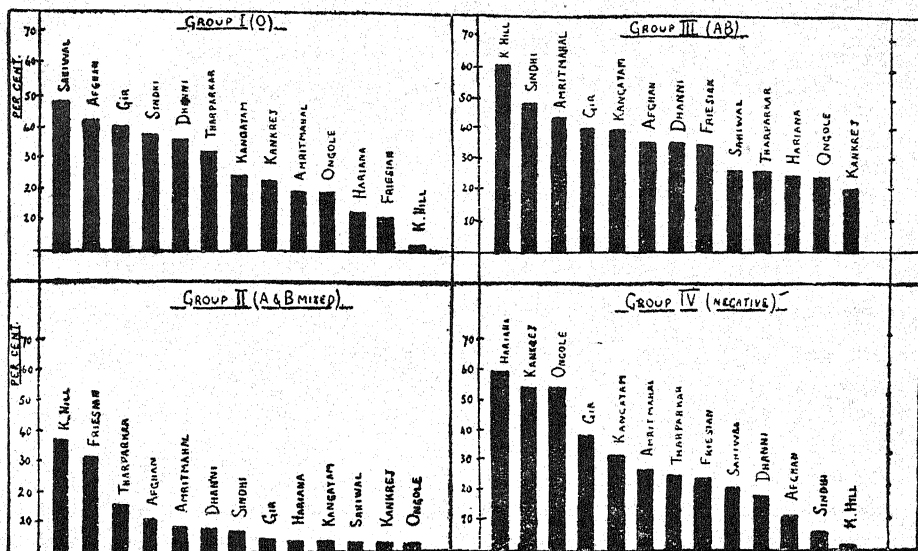


Fig. 2. Blood-group distribution of 13 breeds of cattle in India.

people became isolated from the rest of mankind before the respective mutations took place or before they spread very far.

Limitations of time and space preclude the possibility at this stage of our work of drawing a thoroughly comprehensive picture of the relationship of the various Indian cattle. It is hoped that data provided here will form the basis for further work and indicate lines of research. Nevertheless, certain interesting points emerge, which may be discussed briefly.

Kumauni hill breed.—The blood-group frequencies of this breed reveal striking differences from those of the other Indian breeds so far tested. The absence of relationship to any other Indian breed, particularly in the non-appearance of group O, suggests a distinct origin. The Mongolian wave of immigration (Census of India, 1931 I(1)) from the Chino-Tibetan border into the Himalaya, Assam and Burma may have been instrumental in introducing these cattle into these ranges.

These small cattle are confined to the Himalayan sub-ranges and these are connected with the Tibetan ranges. It would be interesting to study the blood-groupings of Tibetan and other Mongolian breeds of cattle, or at least other Himalayan hill cattle in India, to see whether geographical proximity has provided the means of importation, adaptation and spread of these cattle in the Himalayan ranges. Their blood-group similarity with Friesians is suggestive, but no solid hypothesis is possible because few of the latter could be tested. It is intriguing however to find that both Friesian

and Kumauni cattle are decidedly more susceptible to rinderpest than other breeds.

Sahiwal, Afghan, Gir and Red Sindhi.—These breeds reveal a striking preponderance of group O, and an equally low frequency of groups A and B (mixed). This, clearly establishes a close inter-relationship among those breeds and supports Olver's hypothesis, that the Sahiwal and Sindhi breeds are derived from contact with Afghan and Gir cattle. It is further established that their origin is distinct from the white-grey cattle of India.

Kankrej, Ongole and Hariana. In all these breeds there is a very low frequency of group O, whereas AB frequencies are fairly high and there is great similarity as regards group IV (negative). The Hariana cattle, tested at Hissar, it is understood, have a small admixture of Kankrej blood. In spite of this, there is a greater affinity between the Hariana and Ongole as regards group O and AB. Geographically, these two breeds are widely separated, the Ongole being confined to a small tract near the eastern coast of south India. These animals have no morphological similarity with any of the neighbouring breeds. Hariana cattle are situated well to the north, but show marked resemblance to the Ongole breed. The blood-group findings again provide support to the views of Olver and of Ware, as to the common origin of these breeds.

The Dhanni breed. This breed shows a fairly high frequency O. This factor and the location of these cattle, on the route from Afghanistan to India, suggest the incorporation of blood from Afghan or some allied breed during their evolution.

The Tharparker breed. This has a fairly high frequency of group O and A and B (mixed), and this suggests that the breed is a cross between they grey and Gir types of cattle. Observations on a large number of cattle of this breed revealed much variation in cranial formation. On morphological and serological grounds, these cattle cannot be granted the rank of a regular breed. Further investigations, however, may throw more light on the matter.

Amritmahal. This famous breed falls into a group comprising the Kangayam, Ongole and Kankrej breeds. The blood-group relationships to these three breeds are too close to be ignored, and this raises the interesting possibility that the breed may not after all have been imported in a separate migration wave, but may be the outcome of the magnificent efforts of the rulers of Mysore to evolve an army transport beast by the crossing of local south India cattle (Kangayam breed) with grey-white cattle (Ongole-Kankrej). Otherwise, there must be some common ancestry in their original home.

Summary

1. The blood-group distribution of 11 Indian and two foreign breeds, comprising 1,199 head of cattle, has been studied. With the exception of Friesians, all the cattle tested were of Zebu type.

2. The final blood grouping by percentages is: group O, 26.8; group A and B (mixed), group AB, 36 and group IV (negative), 28.8. The blood-group frequencies for each breed behave as independent units and indicate possible origin and relationship with other breeds.

3. Gir, Red Sindhi, Sahiwal and Afghan cattle show a similarity in blood-grouping, especially in respect of the frequency of group O, so that these four breeds may be regarded as related.

Haryana, Ongole, Kankrej and Amritmahal were also very similar to one another and so may be from the same stock or closely related,

Dhanni, Tharparker and Kanayam breeds represent intermediate types.

Kumauni hill cattle appear to be a separate entity in India. Their blood-group similarity to that of Friesian cattle and the high susceptibility of both these breeds to rinderpest has been pointed out.

4. A blood-grouping classification for Indian cattle has been provisionally fixed, and a differentiation of A and B groups by absorption tests has been made. The ratio of groups A and B in Kumauni hill cattle was 2 : 1.

5. Attention has been called to the geographical distribution and morphological characters of Indian breeds.

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THE COMPARATIVE VALUE OF SOME CONCENTRATES IN THE FEED OF GROWING CATTLE*

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Concentrates can be broadly classified into three groups according to the composition. Linseed cake, decorticated undecorticated groundnut cakes, til (*Sesamum indicum*) cake, rape cake, cottonseed cake and guar (*Cyamopsis psoralioides*) are the common concentrates of India, having a protein content of over 30 per cent. Coconut cake, cotton seed, pulses (legume seeds) and pulse by-products are moderately rich in protein and have nutritive rations similar to the standard required for production. Cereal grains make the third group of concentrates which are comparatively rich in carbohydrates but low in protein content.

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This paper deals with the feeding value, for the production of growth, of five oil cakes, viz. linseed cake, decorticated and undecorticated groundnut cakes, rape cake and til cake and four legume seeds or their by-products, viz. guar, gram (*Cicer arietinum*), arhar (*Cajanus indicus*) chuni and mung (*Phaseolus mungo*) chuni. The chuni is the by-product from the manufacture of split pulse (*dal*) for human consumption. It contains chiefly the hulls, along with the germs and broken particle of the seed. In all the tests of this series, linseed cake was used as the control, because it is one of the most popular protein supplements for cattle and produces good results even when used as the only concentrate.

Feeding Trial with Linseed Cake, Undecorticated Groundnut Cake, Gram and Arhar chuni (1940)

In August 1940, tests to find out the comparative feeding values of linseed cake, undecorticated groundnut cake, gram and arhar chuni for growth were started with 20 Hissar heifers. The basal ration, which consisted of wheat straw *ad lib.*, 11 lb. jowar (*Sorghum vulgare*) silage, 1.55 lb. wheat bran and linseed cake for protein supplement, was fed to all the animals for a period of eight weeks and thereafter they were distributed into four comparable groups according to age, liveweight and rate of growth during the basal period. For the experimental feeding, group I was allowed to continue the basal ration and groups II, III and IV received groundnut cake, gram and arhar chuni respectively in place of linseed cake, the quantity being regulated to maintain the same level of protein for different groups. Records of daily liveweight and food consumption for each animal were maintained during the test which lasted for a period of 21 weeks. The distribution of animals for the different treatments and their liveweight increase during the experimental period have been recorded in Table I.

Rate of growth with the different rations. The rate of growth by the different treatments has been statistically analysed and the summary of the results is shown in Table II. Undecorticated groundnut cake produced the lowest average growth rate. Linseed cake came next and, though the average growth rate is very significantly higher than that with groundnut cake, it is lower than that with gram and arhar chuni. The difference between gram and arhar chuni is not significant. The fall in the growth rate from gram to linseed cake is 19.48 per cent, from gram to groundnut cake is 53.60 per cent, and from linseed cake to groundnut cake 34.12 per cent, the critical difference at 5 per cent level being 12.97 per cent. Similarly, between arhar chuni and linseed cake and between arhar chuni and undecorticated groundnut cake the differences in the average growth rates are 23.35 and 57.47 per cent respectively, the critical difference being 14.50 per cent.

TABLE I
Distribution of the animals into different groups and their liveweight (lb.)

	Linseed cake						Groundnut cake (undecorticated)			
	1	2	3	4	5	6	7	8	9	10
Age on 28 August 1940 (year, months and days) ...	1-8-24	1-8-18	1-7-9	1-7-13	1-8-13	1-8-27	1-7-29	1-9-5	1-7-3	1-6-29
Average age of the group ...		1 year 7 months 3 days					1 year 7 months 1 day			
Average liveweight at the start of the experiment on 28 August 1940 ...	519	452	450	422	457	483	486	443	472	425
Average liveweight of the group ...		460						462		
Average liveweight at the close of the experiment on 21 January 1941 ...	627	595	623	552	604	559	595	539	587	535
Total increase ...	108	143	173	130	147	76	109	96	115	110
Average increase of the group ...			140					101		
Gram						Arhar chuni				
	11	12	13	14	15	16	17	18	19	20
Age on 28 August 1940 (year, months and days) ...	1-8-5	1-7-3	1-9-9	1-7-19	1-8-24	1-8-0	1-8-7	1-8-12	1-8-3	1-7-14
Average age of the group ...		1 year 7 months 6 days					1 year 7 months 1 day			
Average liveweight at the start of the experiment on 28 August 1940 ...	489	473	451	460	427	513	492	413	424	472
Average liveweight of group ...		460						475		
Average liveweight at the close of the experiment on 21 January 1941 ...	684	672	634	596	575	662	682		598	636
Total increase ...	195	199	183	136	148	149	190		174	164
Average increase of group ...			172					170		

TABLE II
Summary of results (rate of growth by different treatments)

Treatments	Linseed cake	Groundnut cake (undecorticated)	Gram	Arhar chuni	Mean
Average increase per week (lb)	7.11	4.66	8.51	8.79	7.19
Percentage of the mean ...	98.94	64.82	118.42	122.29	100.00
Critical difference at 5 per cent	0.93	0.93	0.93	1.04	...
Per cent critical difference of mean	12.97	12.97	12.97	14.50	...
Rate of change of growth rate	-0.0806	-0.0109	-0.1416	-0.1916	-0.1017
Percentage of mean ...	79.21	10.74	139.23	188.43	100.00
Critical difference at 5 per cent	0.0757	0.0757	0.0757	0.0846	...
Per cent critical difference of mean	74.39	74.39	7.349	83.18	...

The variations due to treatments in the case of average rate of change of growth rate is also significant.

Feeding Trail with Linseed Cake, Decorticated Groundnut Cake, Rape Cake and *Mung chuni* (1941)

Sixteen Hissar heifers were selected for this test in September, 1941. The basal ration was the same as in the previous test, except that rape cake was fed instead of linseed cake during this period as it was found that animals do not relish a change from linseed cake to rape cake. The basal feeding lasted for three weeks, after which the animals were distributed into four comparable groups. One group was allowed to continue the rape cake ration, and for the other three groups rape cake was replaced by either linseed cake, groundnut cake or *mung chuni*. The procedure was the same as in the previous test. The distribution of the animals for the different treatments and the gain in their liveweights during the 18 weeks of experiment are shown in Table III.

Rate of growth. The results of the statistical analysis have been summarized in Table IV. Decorticated groundnut cake has produced significantly the lowest average growth rate. Rape cake and linseed cake come next in order the difference between them is not significant, but both produced significantly lower growth rate than *mung chuni*, the average growth rates per week with these feeds being 4.96, 6.30, 6.84 and 8.72 lb. respectively. The fall in the growth rate from *mung chuni* to rape cake is 36.03 per cent, from *mung chuni* to groundnut cake is 56.04 per cent, and from rape cake to groundnut cake 20.01 per cent, the critical difference at 5 per cent level being 19.64 per cent. Similarly from *mung chuni* to linseed cake and from linseed cake to groundnut cake, the average growth rate is 27.90 and 28.14 per cent respectively. The variation due to treatments in the average rate of change of growth rate is also significant.

Feeding test with linseed cake, *til* cake and *guar* (1942)

The experiment to study the comparative feeding values of linseed cake, *guar* and *til* cake was started in April, 1942 with 15 Hissar heifers. The constituents of the basal ration were the same as those during the first test of the series. The experiment was conducted for 16 weeks after a preliminary feeding for four weeks. There were five replications for each treatment. The distribution of the animals in three groups and their live-weight increase during the experiment have been recorded in Table V.

Rate of growth. The summary of results of statistical analysis for the rate of growth is given in Table VI. It is observed that the rate of growth with *til* cake is significantly lower than that with linseed cake or *guar*. The fall in the rate of growth from linseed cake to *til* cake is 25.49

TABLE III
Distribution of animals into groups and their average liveweight (lb).

	Linseed cake				Groundnut cake (decorticated)			
	1	2	3	4	5	6	7	8
Age on 11 October 1941 (year, months and days)	1-7-28	1-7-4	1-6-15	1-6-11	1-7-18	1-7-12	1-6-21	1-6-15
Average age of group	...	...	...	...	...	...	...	...
Average liveweight at the start of the experiment on 11 October 1941	407	1 year 7 months 432	363	416	414	1 year 7 months 1 day 376	403	430
Average liveweight of the group	...	404	...	...	...	406	...	...
Average liveweight at the close of the experiment on 14 February 1942	530	582	497	533	509	471	506	513
Total increase	123	150	134	117	95	95	103	83
Average increase of the group	...	131	...	...	...	94	...	...
	Rape cake				Mung chuni			
	9	10	11	12	13	14	15	16
Age on 11 October 1941 (year, months and days)	1-7-18	1-7-3	1-6-27	1-6-2	1-7-24	1-7-7	1-6-19	1-6-14
Average age of group	...	...	...	...	...	...	...	...
Average liveweight at the start of the experiment on 11 October 1941	437	1 year 6 months 27 days 401	396	376	380	1 year 7 months 1 day 440	427	395
Average liveweight of the group	...	402	...	...	...	404	...	...
Average liveweight at the close of the experiment on 14 February 1942	541	498	533	496	549	587	583	552
Total increase	104	97	137	120	169	173	156	157
Average increase of the group	...	115	...	...	...	164	...	...

TABLE IV

Summary of results (rate of growth by different treatments)

Treatments	Linseed cake	Groundnut cake (decorticated)	Rape cake	Mung chuni	Mean	Critical difference at 5 per cent
Average increase per week (lb)...	6.84	4.96	6.30	8.72	6.705	1.317
Percentage of the mean ...	102.10	73.96	93.97	130.00	100.00	19.64
Rate of change of growth rate ...	-0.1591	-0.0438	-0.0913	-0.2479	-0.1355	-0.1339
Per cent rate of change of growth rate ...	117.40	32.32	67.39	183.00	100.00	98.45

per cent and from *guar* to *til* cake 43.18 per cent. *Guar* has produced the highest rate of growth and the fall in the rate of growth from *guar* to linseed cake is 17.69 per cent, but it is not significant being less than the critical difference of 24.59 per cent.

Comparative rate of growth with the different concentrates

Striking differences in the average growth rates due to the different treatments can be seen when the experimental data are plotted on the graph (Fig. 1). The curves for groundnut cakes, both decorticated and undecorticated, rape cake and *til* cake are less steeply inclined than those with linseed cake. Better rates of growth are to be found with *arhar chuni*, gram, *mung chuni* and *guar*. These findings are substantially confirmed by the statistical analysis. The data obtained during the three years of experiment have been analysed to study the comparative feeding value of the concentrates. The summary of the results is shown in Table VII.

The differences in the rates of growth obtained with linseed cake during the three experiments are not significant yet they are not the same which may be due to seasonal variations or other factors during the three different years. It is observed from Table VII that the average rates of growth with undecorticated and decorticated groundnut cakes are not significantly different from that with *til* cake but are significantly lower than that with the remaining concentrates. The growth rate with *til* cake is not significantly different from that with rape cake, but is lower than those with linseed cake, *guar*, gram, *arhar chuni* and *mung chuni*. The growth with rape cake is not significantly lower than that with linseed cake, but is lower than the figures obtained for *guar*, gram, *arhar chuni* and *mung chuni*. The rate of growth with linseed cakes is not significantly different from

TABLE V
Distribution of animals into different groups and their liveweight (lb.)

	Linseed cake					Til cake					Guar				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Age of 21 April 1942 (year, months and days)	1-8-12	1-5-9	1-4-21	1-4-8	1-3-23	1-6-2	1-5-27	1-5-12	1-4-48	1-4-2	1-7-17	1-5-13	1-5-4	1-4-14	1-3-22
Average age of the group	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Average liveweight at the start of the experiment on 21 April 1942..	429	346	395	316	354	383	369	426	317	341	427	388	372	300	360
Average liveweight of group	...	...	368	...	...	...	...	367	...	...	...	...	369	...	...
Average liveweight at the close of the experiment on 11 August 1942	535	422	503	449	465	457	487	508	418	394	556	509	503	452	496
Total increase	106	76	108	133	111	74	118	82	101	53	129	121	131	152	136
Average increase of the group	...	...	107	...	...	...	...	86	...	...	...	...	134	...	...

TABLE VI

Summary of results for rate of growth

Feeds	Linseed cake	Til cake	Guar	Mear	Critical difference at 5 per cent
Average increase per week (lb)	6.85	5.15	8.03	6.67	1.64
Percentage of the mean.	102.70	77.21	120.39	100.00	24.59

that with *guar*, but is lower than those with *gram*, *arhar chuni* and *munḡ chuni*. The differences obtained among *guar*, *gram*, *arhar chuni* and *munḡ chuni* are not significant. The results can be symbolically represented as follows :

Groundnut cake (undecorticated)	...	...	4.58
Groundnut cake (decorticated)	...	...	4.96
Til cake	...	...	5.15
Rape cake	...	...	6.30
Linseed cake (1942)	...	...	6.83
Linseed cake (1941)	...	...	6.87
Linseed cake (1940)	...	...	7.13
<i>Guar</i>	...	...	8.03
<i>Gram</i>	...	...	8.77
<i>Arhar chuni</i>	...	...	8.79
<i>Munḡ chuni</i>	...	...	9.83

The variations observed in the growth rate may be due to higher consumption, better digestibility of the total ration on account of the presence of certain concentrates or superior value of the nutrients of some concentrates.

Consumption of total ration as influenced by the different concentrates.

The average consumption per animal per day in all the treatments and the intake per 100 lb. of liveweight have been tabulated in Table VIII. The average composition of the feeds during the experiment is given in Table IX.

Smaller quantities of concentrates richer in protein were fed to maintain the same level of protein for all the treatments, and it is noted that the consumption of total dry matter was also lower in these groups. Concentrates and coarse fodders were fed separately. Where the quantity of concentrate was comparatively higher, as with *arhar chuni* and *munḡ chuni* the intake of wheat straw was slightly lower, but in most of the treatments its intake, though fed *ad lib*, did not appreciably increase with the lower amount of concentrates, which indicates that the animals were usually

TABLE VII
Summary of results of combined analysis

	1940				1941				Mean	Critical difference 5 per cent		
	Linseed cake	Groundnut cake un- decorticated	Gram	Arhar chuni	Linseed cake	Groundnut cake decorticated	Rape cake	Mung chuni		Treatments with 4 animals	Treatments with 5 animals	Treatments one with 4 and the other with 5 animals
Average increase per week (lb)	7.13	4.58	8.77	8.79	6.87	4.96	6.30	8.83	6.91	1.50	1.35	1.43
Percentage of mean.	103.18	66.28	126.92	127.21	99.42	71.78	91.17	127.79	100.00	21.71	19.54	20.69

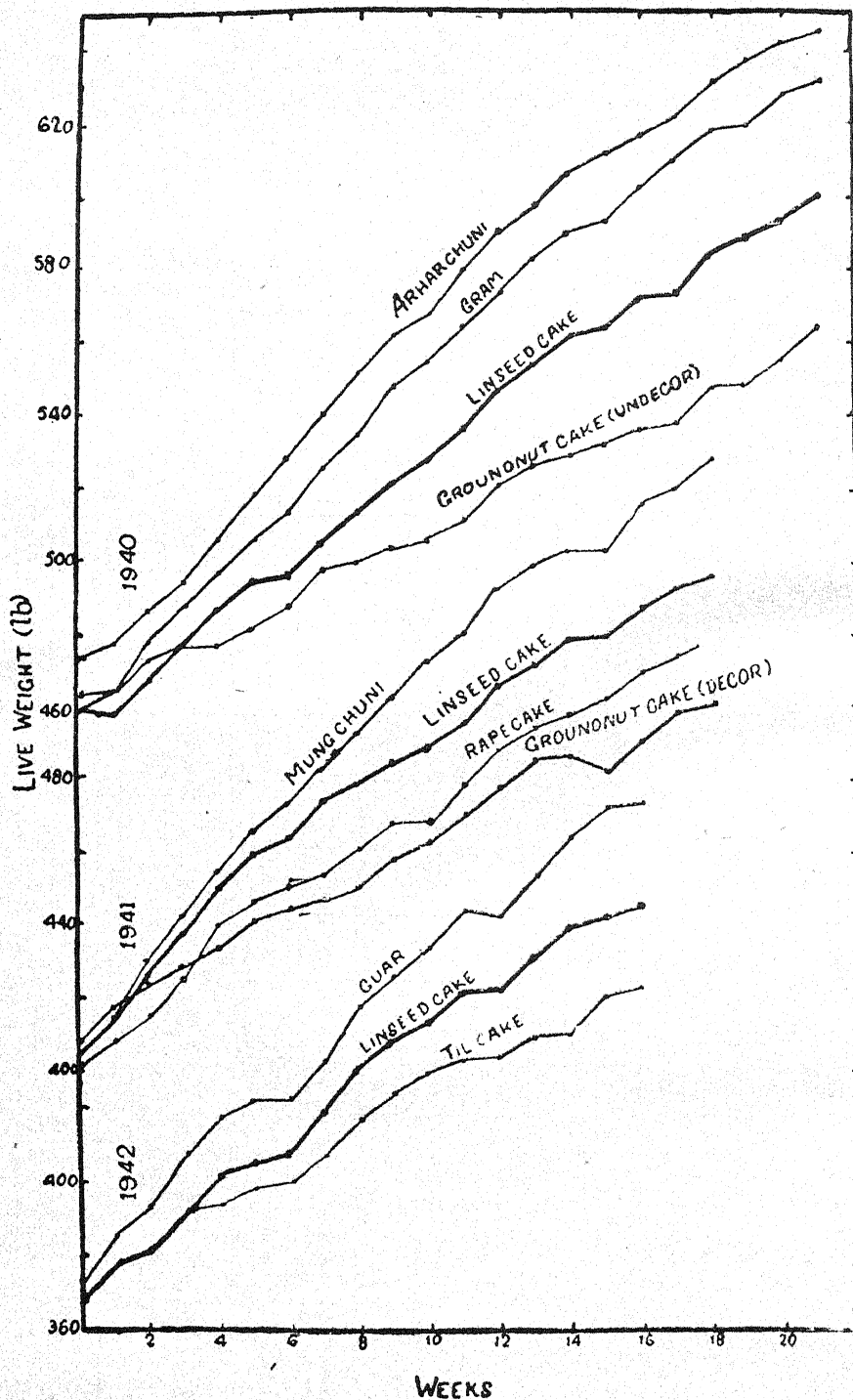


FIG. 1. Rate of growth with different concentrates

TABLE VIII
(Intake of total dry matter per day with the different concentrates) lb.

Treatments	Wheat straw	Silage	Wheat bran	Concentrates	Total	Average live-weight	Intake per 100 lb. live-weight
1940							
Linseed cake	2.92	4.08	1.40	2.95	11.35	530	2.14
Groundnut cake (undecorticated)	2.70	4.07	1.40	2.98	11.15	512	2.18
Gram	2.67	4.06	1.40	4.39	12.52	546	2.29
Arhar chuni	2.49	4.07	1.38	5.34	13.28	560	2.37
1941							
Linseed cake	2.45	4.28	1.41	2.82	10.96	470	2.33
Groundnut cake (decorticated)	2.42	4.27	1.41	1.48	9.58	452	2.12
Rape cake	2.39	4.25	1.41	2.45	10.50	460	2.28
Mung chuni	1.64	4.26	1.41	5.31	12.62	486	2.60
1942							
Linseed cake	1.73	4.41	1.41	2.21	9.76	427	2.29
Til cake	1.82	4.39	1.37	1.61	9.19	415	2.21
Guar	1.67	4.37	1.39	3.05	10.48	444	2.36

TABLE IX
Average percentage composition of feeds on dry basis

Feeds	Organic matter	Protein	Ether extract	Fibre	N-free extract	Total carbo-hydrates
1940						
Wheat straw ...	91.2	2.01	0.675	39.9	48.7	88.5
Jowar silage ...	88.3	3.27	0.618	36.1	48.2	84.3
Wheat bran ...	93.6	15.06	3.163	11.2	64.2	75.4
Linseed cake ...	92.3	31.05	7.033	8.4	45.1	54.5
Groundnut cake (undecorticated)	87.0	31.57	9.279	20.9	25.3	46.2
Gram ...	96.0	21.90	4.015	9.5	60.6	70.1
Arhar chuni ...	91.6	19.36	1.542	19.0	51.7	70.7
1941						
Wheat straw ...	90.4	2.37	0.865	39.3	47.9	87.2
Jowar silage ...	88.4	5.30	1.702	31.6	49.8	81.4
Wheat bran ...	94.6	12.50	3.397	13.0	65.7	78.7
Linseed cake ...	90.0	33.03	3.082	9.0	44.9	53.9
Groundnut cake (decorticated)	92.5	52.90	7.647	6.7	25.2	31.9
Rape cake ...	90.6	57.74	8.121	8.1	36.7	44.8
Mung chuni ...	89.1	22.24	1.253	15.0	50.6	65.6
1942						
Wheat straw ...	92.1	3.04	0.510	42.8	45.8	88.6
Jowar silage ...	88.4	5.11	1.426	32.5	49.5	82.0
Wheat bran ...	92.0	14.53	3.459	11.8	62.2	74.0
Linseed cake ...	93.1	36.56	3.910	9.4	43.3	52.7
Til cake ...	87.0	46.78	7.364	5.0	27.9	32.9
Guar ...	95.4	30.56	2.940	10.0	51.9	61.9

satiated with the average total dry matter consumed in the oil cake treatments. Thus it appears that on an average 2'22 lb. total dry matter per 100 lb. liveweight is necessary for Hissar heifers between one and two years of age and weighing between 400 and 500 lb., but the rate of consumption may be higher if the ration consists mostly of palatable feeds. In the *mung chuni* treatment, the average consumption per 100. lb. liveweight was as high as 2'60 lb. The higher intake of dry matter must have influenced, to some extent, the better growth rate with *guar*, *gram*, *arhar chuni* and *mung chuni*.

Effect of the concentrate on the digestibility of the total ration. Digestibility trials were conducted with three animals under each treatment during 1940 and 1941 and with two animals in 1942. The average digestibility coefficients of the nutrients of the total ration for each treatment have been recorded in Table X.

When *gram*, *guar* or pulse by-products are present in the ration both organic matter and total carbohydrates are better digested, whereas the digestibility of protein is superior when concentrates richer in protein are fed.

This indicates that the concentration of a nutrient in the total ration plays an important role in its digestibility. The level of protein was the same in all the treatments, but due to a lower intake of total dry matter the concentration of protein was higher in the treatments with feeds richer in protein, resulting in its better digestibility. The same tendency is noticed with the digestibility of ether extract. Similar observations were made by the author [1943] on a previous occasion. The lower digestibility of protein of the total ration with *gram*, *arhar chuni* and *mung chuni* might also have been influenced by the presence of more easily digestible carbohydrates.

Gain in liveweight in relation to the intake of digestible nutrients. The increases in liveweight per unit of digestible protein and total digestible nutrients have been calculated (Table XI) to compare the feeding value of the nutrients from the different concentrates. The pulses and pulse by-products have always given higher increase in liveweight per unit of digestible protein. This greater increase cannot be attributed only to the quality of protein, as more carbohydrates also had to be ingested as a result of maintaining the same level of protein in these treatments. Balancing of both protein and carbohydrates, which is necessary for such experiments, is only possible by supplementing purified diets, but this is not practicable specially with dairy cattle, in long period feeding trials. In the experiment during 1940, the actual amount of protein digested was lower than the calculated quantity given to the animals of *gram* and *arhar chuni* groups, and hence, the level of protein supplement was lower for these two treatments. But the increase in liveweight per unit of total

TABLE X
Digestibility of total ration with the different concentrate (per cent)

Treatments	Organic matter	Protein	Ether extract	Fibre	N-free extract	Total carbohydrates
1940						
Linseed cake ...	...	62.8	77.3	56.2	55.7	55.7
Groundnut cake (undecorticated) ...	59.2	63.2	79.6	51.2	54.7	54.5
Gram ...	65.0	59.7	72.6	61.8	66.6	65.0
Arhar chuni ...	62.7	50.9	65.1	71.0	60.9	65.0
1941						
Linseed cake ...	...	61.9	61.7	59.7	59.9	59.9
Groundnut cake (decorticated) ...	61.2	63.1	65.3	59.4	56.3	57.4
Rape cake ...	59.9	63.1	73.5	58.7	58.1	58.3
Munã chuni ...	60.5	56.5	47.4	58.5	63.9	62.1
1942						
Linseed cake ...	...	68.2	58.6	56.0	60.6	59.0
Til cake ...	60.1	68.3	71.5	54.2	56.8	55.9
Guar ...	64.0	68.3	63.7	57.9	66.0	63.2

digestible nutrients was the same even with this lower protein supplement. *Mung chuni* and *guar* in 1941 and 1942 respectively have produced decidedly better rate of growth per unit both digestible protein and total digestible nutrients. Thus it appears that for growing animals protein from gram, *arhar chuni*, *munḡ chuni* or *guar* is superior to that from the oilcakes.

TABLE XI

Gain in liveweight in relation to the intake of digestible nutrients (lb.)

Treatments		Live-weight increase	D. P. intake	T. D. N. intake	Increase per lb of D. P.	Increase per lb of T. D. N.	Average live-weight
1940							
Linseed cake	...	140	121.9	911.8	1.15	0.15	530
Groundnut cake (undecorticated)	...	101	124.4	868.3	0.82	0.12	513
Gram	...	172	119.1	1132.8	1.44	0.15	546
<i>Arhar chuni</i>	...	170	106.6	1132.8	1.60	0.15	560
1941							
Linseed cake	...	131	108.6	770.9	1.21	0.17	470
Groundnut cake (decorticated)	...	94	97.3	663.6	0.98	0.14	452
Rape cake	...	115	110.0	741.5	1.05	0.16	460
<i>Munḡ chuni</i>	...	164	115.4	886.5	1.42	0.19	486
1942							
Linseed cake	...	107	98.6	616.2	1.09	0.17	427
<i>Til</i> cake	...	86	94.1	559.7	0.91	0.15	415
<i>Guar</i>	...	134	107.6	707.7	1.25	0.19	444

Relative economy of the concentrates

The cost for production of 100 lb. liveweight with all the concentrates is shown in Table XII.

The tests were carried out for three consecutive years and the prices of feeds varied from year to year. Hence, to compare the cost of production with the different concentrates, the prices of all the roughages and bran have been taken as the same as in 1941 and those of the concentrates have been modified and brought to the 1941 level on the basis of variation of the price of linseed cake from year to year. The comparative cost of the total ration for the production of 100 lb. liveweight (Table XII) show that for production of the same liveweight rape cake is the cheapest amongst all the concentrates, next in order come groundnut cake (decorticated), *guar*, *munḡ chuni*, linseed cake, *til* cake, *arhar chuni*, groundnut cake (undecorticated) and gram.

TABLE XII
Relative economy of the concentrates

Concentrate	Gain in liveweight	Quantity of concentrates fed	Prices per 100 lb during experiment	Cost of total ration for 100 lb. increase in liveweight	Prices per 100 lb. on the basis of 1941 rate	Comparative cost of production of 100 lb. live-weight on the basis of 1941 rate	Equivalent quantities
	Lb.	Lb.	Rs.	Rs.	Rs.	Rs.	Lb.
1940 (21 weeks)							
Linseed cake	140	433.6	2.745	17.34	2.745	14.67	100
Groundnut cake (undecorticated)	101	438.0	1.829	19.34	1.829	16.53	135
Gram	172	645.4	3.354	20.35	3.354	17.22	120
Arhar chuni	170	784.8	2.256	17.78	2.256	15.04	137
1941 (18 weeks)							
Linseed cake	131	372.9	2.745	14.67	2.745	14.67	100
Groundnut cake (decorticated)	94	192.9	1.829	13.21	1.829	13.21	77
Rape cake	115	324.3	1.829	12.87	1.829	12.87	99
Mung chuni	164	705.3	2.073	14.01	2.073	14.01	138
1942 (16 weeks)							
Linseed cake	107	266.7	3.659	25.4	2.745 ¹	14.67	100
Til cake	86	196.4	3.049	27.3	2.288	14.75	93
Guar ...	134	370.5	3.659	22.9	2.745	13.92	104

The comparative economic value of a feed cannot be assessed only by the market prices which always vary. Therefore the quantities of different concentrates which produce the same increase in liveweight have been shown in the last column (Table XII). But for true economy the time factor should also be taken into account as with better rate of growth, the period of unproductiveness is shortened. It appears that when the rate of growth is taken into account *guar* is definitely more economical than the oilcakes, and both *arhar chuni* and *munḡ chuni* may also prove cheaper in the long run.

Summary

Trials were conducted to study the comparative feeding values of linseed cake, decorticated and undecorticated groundnut cakes, rape cake, *til* cake, *guar*, gram, *arhar chuni* and *munḡ chuni* with Hissar heifers. The tests were carried out in three sets during 1940, 1941 and 1942. Linseed cake was used as control in all the sets. Varying quantities of the different concentrates were fed to maintain the same level of protein in all the treatments.

In the first test, it was found that gram and *arhar chuni* produced better growth than linseed cake, while undecorticated groundnut cake proved inferior. Among the concentrates tested in the second year, *munḡ chuni* gave the highest rate of growth, followed in order by linseed cake, rape cake and decorticated groundnut cake. The difference in the growth rates with linseed cake and rape cake was not significant. In the third set, the growth rates were in the decreasing order of *guar*, linseed cake and *til* cake.

On comparing the data for all the concentrates, it was found that under the conditions of these experiments groundnut cakes both decorticated and undecorticated resulted in the least favourable rate of growth. *Til* cake and rape cake come next in order of increasing value, followed by linseed cake. Linseed cake was of about the same value as *guar* and was inferior only to gram, *arhar chuni* and *munḡ chuni* which gave the best results.

The digestibility of organic matter and total carbohydrate was higher when pulse or pulse *chuni* was present in the ration, while that of protein was superior when the concentrates richer in protein were fed. This variation appears to be due to the concentration of the nutrient in the total ration.

Protein of gram, *arhar chuni*, *munḡ chuni* and *guar* appears to be of superior quality as compared to that of the oilcakes for growing Hissar cattle. *Munḡ chuni* and *guar* produced the best rates of growth per unit of

total digestible nutrients as well. For the production of the same liveweight rape cake has been found to be the cheapest. Next in order come decorticated groundnut cake, *guar*, *munḡ chuni*, linseed cake, *til* cake, *arhar chuni*, undecorticated groundnut cake and gram. But when the rate of growth is taken into account, which determines the period of unproductiveness the feeding of *guar* is definitely more economical than the oilcakes and both *arhar chuni* and *munḡ chuni* may also prove cheaper in the long run.

With normal feeds, the consumption of dry matter for Hissar heifers weighing between 400 and 500 lb. is, on an average, 2.2 lb. per 100 lb. liveweight.

Acknowledgements

Acknowledgement is due to the Imperial Council of Agricultural Research for financing the Cattle Feeding Research Scheme, U.P., which offered scope for this work. The author desires to express his thanks to Mr C. Maya Das, I.A.S., Director of Agriculture, United Provinces and Mr. Sultan Singh, Deputy Director of Agriculture, Bundelkhand Circle, Jhansi, for the facilities provided and the keen interest taken in these investigations. The author also acknowledges with thanks the help received from Mr K. Kishan, Statistician, Agricultural Department, United Provinces, in the statistical analysis, Dr S. P. Srivastava and Mr I. N. Sharma, Research Assistants, for the analytical work and the compilation of the experimental data and Messrs V. R. Singh and R. S. Gupta, Farm Superintendents, for providing the animals and making arrangements for the fodders.

Reference.

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"Veterinary medicine must be brought back from the laboratory to the stable and byre. The clinician is the most important man in the profession. If all the laboratories were closed, the profession would live. If the clinicians were removed, the profession would die."

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Editorial

THE LIVESTOCK SECTION—MADRAS

We are glad to learn that the Government of Madras have refused to be hustled into taking a hasty decision on the question of separating the Livestock Section from the Veterinary Department. The matter is to be taken up again at the next meeting of the Provincial Livestock Improvement Board for consideration. What we have been pleading for is only a just and careful study of all aspects of the question, not so much in the interest of the Department itself as in the interest of the country.

We are given to understand that facts and figures are being manipulated to discredit the work of the Veterinary Department. Comparisons are sought to be made between pre-war period and the periods of war and post-war depression. Does it require much imagination to state that the latter period will certainly compare unfavourably with the pre-war period, when everything was in plenty and easily available?

Several factors go to make up the data of a Livestock Research Station—in particular, the age of the animals, the number of animals under each group, the number of animals in lactation, the number of lactation of each animal in the groups, the feed that was available, favourable and unfavourable seasons, the skilled or un-skilled labour available etc., etc., before one can

think of comparing either the milk-yield of cows, the weights of animals or the birth-weights of calves, etc. These data can still further be subjected to the "pick and choose" method to suit one's object in view. Our contention therefore is that too much value should not be attached to such *produced* records by way of propaganda. Photos of a few bad-doers in animals are taken and advertised—so, we are informed. We refuse to believe that such propaganda is tolerated by Government.

On the other hand, we are told that, as a result of the sound breeding programme followed on approved scientific lines by the Veterinary Department, most of the heifers which have calved recently and have come into milk, are proving such heavy milkers that they promise to break all previous records. By introduction of fresh blood and through proper selection of stud bulls, it has been possible to produce better calves amongst the Kangayams and Hallikars which were showing signs of deterioration previously. Space prevents us from publishing the long list of improvements effected on the Farms both at Hosur and Lam. All these have been achieved within the short space of eight years. But such records will not see the light of day, for they do not serve the purpose in view of the propagandist.

True it is that it fell to the lot of the Veterinary Department to start managing the Livestock work mainly during the period of war and after. Break-downs in the supply of cattle-feed were common due to scarcity and transport difficulties; labour was scarce; fodder-fields were ploughed up and converted into vegetable garden to supply vegetables to the Army; three times the number of Livestock normally stocked on the Farm had to be maintained to supply nearly 1500 to 2000 pounds of milk and 35 pounds of butter daily to the Army; the failure of monsoons in three consecutive years, which has had such disastrous consequences on the entire country, had not failed to affect the hay position on the Farm and also the water supply; water had to be baled out from improvised wells and 1500 head of cattle kept going without any mortality. It was a herculean task for the Officers concerned. Instead of showing appreciation on the

Department for the excellent work done under the most trying circumstances, it is a strange irony that it should be assailed in this manner.

We are sure that, when the matter is fully gone into, it will be a matter for surprise that the claim for separation should have been entertained at all. We know its genesis. We feel confident that the present Ministry will decide the question without fear or favour.

NEW APPOINTMENTS

We are glad that Sri M. Y. Mangrulkar, M.Sc., M.B.C.V.S., D.T.V.M., who was Lecturer in Pathology and Bacteriology at the Madras Veterinary College has been appointed as the Principal of the newly opened Veterinary College and Livestock Research Institute at Jubbulpore, C.P.

We are also glad that the services of Rao Sahib T. Vinayaka Mudaliar, G.M.V.C., who retired recently as Livestock Development Officer, Madras, have been requisitioned by the Government of India to organise the Central Cattle Breeding Station at Jubbulpore.

We congratulate the above officers on their new appointments and wish them all success.

We cannot but express our regret that the Madras Province which is already in need of experienced Veterinary *personnel* should lose the services of such experienced officers who are experts in their own line. While it is true that Madras Government is very clever in selecting officers suitably for important posts, it is cleverer still in losing their services at the opportune moment. It is a great pity that such things should happen when the administration is in the hands of a popular Ministry.

Clinical Articles

CANINE TICK FEVER—SOME OBSERVATIONS ON THE SEQUELAE OF.

BY

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It is well known to veterinary practitioners in India that 'Tick fever' in dogs is a complex syndrome, in which any of the three causative factors or any combinations of them may operate viz. *B. canis*, *Pattonellidae gibsoni*, and *Rickettsia canis*. In this short note, I wish to record some of the sequelae which I have observed during a severe outbreak of 'Tick fever' in dogs about a year back. The inmates of the Kennel included Cocker, Alsations, Fox-Terriers (smooth and wire coated), Setters, Great Danes, Borzois and also toy breeds such as Poms and Pokes. As the construction of the Kennel was not absolutely tick-proof then, the multiplication of these arthropod vectors was so rapid, that in spite of all our efforts to eradicate and destroy them, they were seen in great numbers on these animals.

The clinical symptoms presented by these cases in general were pyrexia, inappetence, lassitude, pallor of the mucous membranes, haemoglobinuria and enlargement of the spleen which could be easily palpated in the left hypochondriac region. The pulse was accelerated while the respirations were laboured with the characteristic 'puffing' of the cheeks at each respiration. Only in some dogs were these symptoms accompanied by progressive anaemia and recurrent type of fever.

Many chemo-therapeutic agents such as Trypanblue, Trypaflavin, Tryparsamide, Sulphapyridine, Salvarsan, N. A. B. and Sulphathiazole were used. The last mentioned drugs namely N. A. B. (intravenously in doses of 0.01 gms. per lb. body weight) and Sulphathiazole (in doses of 1 gr. per lb body weight orally) have given very good results. But the effects of these drugs and the subsequent recovery of these dogs appeared almost transitory in nature. For, after a full course of treatment with the drugs referred to, out of 30 infected dogs, only 10 could survive. And even these ten recoveries developed the following serious complications in the course of a month :—(1) Paraplegia, (2) Chorea, (3) Encephalitis.

1. *Paraplegia*. Five Cockers and a Pomeranian were the victims of the malady, of which the Pom was the most interesting. This little Pom had a mild attack of 'tick fever' and recovered with Acaprin treatment (0.2 c. c. subcutaneously). After a couple of months, she developed a tilting gait during progression and began to tumble over after walking a few steps. In about a week, she developed definite Paraplegia. The temperature was normal; so also urination and defaecation. She never refused feed till her last moments and recorded no elevation of temperature either. The diet consisted of milk, biscuits, boiled minced mutton and fried fish.

To start with, a course of Pot. Iodide mixtures was given. Then she was put on para-thyroid and calcium tablets alternated with Vitamin B₁ (Binerva Roche). Aricyl and Tonophosphan injections were undertaken later. But no appreciable improvement was noticed. Thereafter diathermy and ultra violet-ray therapy was given a trial; as this also was not yielding any satisfactory result, the galvanic current was tried with no material benefit. It was then decided to take an X-ray photograph of the animal. As it was only a miniature Pomeranian weighing 4 lbs, the whole body was X-rayed in the dorso-lateral position. Calcification of the intervertebral discs between the 10th, 11th and 12th thoracic vertebrae was noticed on radio-graphy. In about a month, her condition worsened. Her head and neck became very stiff, and all efforts to bring the head to the normal position always failed. Slowly, she was reduced to a cripple and died.

2. *Chorea*. A Pekingese and a Tibetan Lhasa were the two dogs that developed this trouble. The disease was first confined to the temporal region, but gradually extended to the neighbouring muscles. In the course of a fortnight, the clonic spasms were seen throughout the body with the head nodding up and down without any respite. Aricyl, Tonophosphan injectable Luminol sodium and Metatone were some of the drugs used. Then iron-arseno-strychnine compound (Glaxo) was injected without any benefit. Ultra violet ray therapy was then given a fair trial. Lastly, a course of Sodium Cacodylate injections was given. A course of bromides to induce sleep and comfort to the patient during extreme stages of excitement was also adopted. But the disease proved practically incurable. Both the patients died after three months.

3. *Encephalitis*. A wire-haired Fox-Terrier and a Pom, suffered from this complication. The dogs were found in an excitable and irritable condition with staring and vacant looks. At short intervals, the patients were seen to lie semi-comatosed; but became wild and delirious with an altered facial expression and locomotor incoordination. The most conspicuous symptom observed in this complication was that the dog was seen always moving in circles and that too in one particular direction, and more often than not, the patients used to walk in a backward direction. Sulphadiazine

internally and Sodium salt of Penicillin intramuscularly were found to have some beneficial effect to allay the severity of the symptoms, but could not bring about a radical cure. The animals had to be eventually destroyed on humanitarian grounds.

Acknowledgement. It is my pleasant duty to thank Lt. Col. Dr. Mehar, M. R. C. V. S. (Lond.) Director, Veterinary Department, for the valuable suggestions given to me from time to time during the course of treatment of these cases, and for permitting me to record these observations.

POISONING BY BARIUM CARBONATE IN A HEN

BY

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A very interesting case of poisoning in a hen by barium-carbonate was admitted in the hospital on 12-12-46 with the following history :—

The owner got some barium carbonate to kill rats and mice in his house. He mixed the above powder with wheat flour and made several pills of it. He scattered these pills in his house and accidentally the said hen took about 14 or 15 pills of this poisonous stuff at about 5 P. M. on 11-12-46. The hen—a Desi breed about one year old—was found next morning in a comatose stage and it was brought to the hospital with following syndrome :—

Temp. 101.2 F., eyes closed, but opened when the bird was made to wake up, pupils dilated, phallanges of the foot crouched inwards, head hanging down, legs, body and wattle very cold, crop highly tympanic. The bird could not support itself.

Treatment :—Adrenalin Hydrochloride (1 in 1000) $\frac{1}{2}$ c. c. was injected subcutaneously. Simultaneously, a glycerine and hot water enema was given to evacuate the bowels. Some balckish-white material was voided with a very foetid odour. Next, the crop was opened out, emptied of its contents, washed thoroughly with a saturated solution of Sodii sulph. solution, and then sutured.

A dose of mag sulph. 15 grs. dissolved in 2 drs. of water was given as an antidote.

The injection of Adrenalin was repeated after 15 minutes and every effort was made to prevent the collapse of the bird ; these were of no avail and the bird died about 2 hours after.

Post-Mortem Findings :

1. Lungs—highly congested. 2. Liver—normal. 3. Heart—enlarged ventricle—empty, auricles contained black clots of blood. 4. The whole digestive tract was inflamed; and there were erosions and haemorrhagic patches all over the mucous membrane of the tract.

COCCIDIOSIS IN CALVES

BY

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Among the protozoal diseases of cattle, coccidiosis in calves plays a great part in the mortality of young calves in certain areas.

During a period of 5 months from November 1940 to March 1941, eleven cases of coccidiosis were treated at this Institution.

Class of animal.	Breed.	Age				Total.
		Under 1 month.	One month.	Two months.	Three months.	
Calves	Local	1	2	5	3	11

All these calves were not at pasture and probably they were infected by suckling infected teats or licking infected areas. It was found that only young calves below *six months of age* were affected.

Symptoms :—In three calves, only diarrhoea of a dark green nature was present while in all the others, diarrhoea with quantities of blood mostly fluid, and not in clots, was observed. Straining was observed in all the cases. In two calves straining occurred for more than three minutes at a time and the calf fell down during the act. Prolapse of the rectum was noticed in one case. One calf had no appetite at all for two days, three calves for one day and the rest had moderate appetite during the course of the disease. One calf was brought at a very late stage and was reported to have died the same night.

The clinical symptoms were quite characteristic and sufficient for diagnosis. Still, the motions were examined and, in all the cases, oocysts were present, in some of them in large numbers.

Treatment :—Copper sulphate, one per cent solution, in one to two ounces doses, was given internally and an enema of the same solution was also given on the first day. Tinctures of opium and catechu in carminative mixture were given subsequently. In one case which had diarrhoea without blood, treatment was given only for three days with success. In five cases, treatment was continued for 5 to 10 days ; in two calves for two weeks and in one calf for three weeks. As regards the other two calves, one discontinued treatment after two days when improvement was noticed, and the other which was brought in the last stage was reported to have died the same night.

All the above 11 calves were of cows only and no buffalo calves were brought for treatment. As buffaloes yield milk without calves, the same attention is not paid when buffalo calves are affected and they are very rarely brought for treatment.

Summary and conclusions :—As nearly all the affected calves maintained a fairly good appetite in spite of the alarming symptoms exhibited, prompt treatment with good nursing, intestinal disinfectants and demulcents generally gave a high percentage of recoveries. When treatment is adopted in early stages, there is no fear of fatal termination. All the above treated calves did not return for the same complaint again for a year afterwards.

Acknowledgment :—My thanks are due to Sri K. R. Lakshminarayana Ayyar, G. M. V. C., District Veterinary Officer, Ramnad at Madura, for his guidance in writing this article.

ANTHRAX AMONG CATTLE—A CLINICAL INVESTIGATION OF AN OUTBREAK WITH SPECIAL REFERENCE TO THE SUBACUTE FORM.

BY

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Introduction.

The purpose of this article is to give a detailed record of the existence of sub-acute cases of anthrax among cattle and to record the symptoms of the affected animals. In my experience of ten years in the field I have attended many outbreaks of Anthrax, but the type of anthrax among cattle to be recorded below has not been noted by me hitherto. The disease as it existed and recorded by me at other places was of

a sporadic nature with a few animals getting the attack and all of them ending fatally. The disease has been known to exist in the acute and the per-acute forms and in both cases the disease terminates fatally in from 24 to 36 hours. From the onset of the attack which is marked by high temperature the disease has always been noted to take a turn towards a fatal end, and the successive symptoms of heavy breathing, restlessness tympany, colic, and in some cases slight diarrhoea, adds only to the quick end of the animal which generally takes place in about 24 to 36 hours.

Details of the outbreak.

This outbreak occurred in Thottapalli-Gudur village of Nellore taluk, about 12 miles from Nellore.

Source of infection.

The source of infection could not be traced out. There was no disease reported to be prevailing then among sheep and goats, from which species of animals the disease generally spreads to cattle.

Season of the outbreak.

The outbreak occurred during the hottest part of the year viz., June and July 1946.

Animals affected.

The animals affected were only cows, bulls and bullocks. It was particularly noted that the attacks were more among working bullocks and bulls and, even amongst them, only animals above the age of four years were found to have been affected.

Period of illness.

The affected animals suffered from 24 hours to 4 days before they either died or recovered.

Symptoms recorded.

The symptoms recorded by me are not as a result of personal observation of the cases but on what the owners detailed out. In as much as the results of enquiries made from different individuals about the symptoms shown by the animal or animals were so closely similar, there need be little doubt about the correctness of their statements. The disease is known in the villages as "narani" meaning enlarged spleen in Telugu and the one feature in all the dead animals when cut open was as given by the ryots, a marked enlargement of the spleen.

The affected animal is reported to be first going off feed and putting on a staring coat denoting rise in temperature. Most of the animals were

reported to have been shivering. It was noted that in some animals the staring coat was observed only on the left side of the body. Some animals had tympany which was recurring but none of the animals were reported to have had any colicky pains. These symptoms were reported to be shown by the affected animals for only 24 to 36 hours after which there was an apparent improvement. They became a bit bright and even start eating a little and ruminating at intervals. At this stage it was reported that the tympany disappeared but some animals were reported to have passed hard dung and strained a bit. Some animals were reported to have been turning their head very often towards the left flank. This apparent improvement was said to be maintained by the animals only for 12 to 24 hours when the animals showed a set-back. They again became off feed, showed staring coat and recurrent tympany; some animals had colicky pains, straining often and passing small quantity of dung, sometimes hard, sometimes semisolid and in some cases blood and mucous-stained. Some animals were reported to have been continuously grinding the teeth. The animals during the later stages of the disease, *i.e.*, at the end of the third day of the attack, developed heavy breathing and were also reported to have had marked jugular pulse. The animal often turned towards the left flank and showed a peculiar arching of the spine. During the terminal stages *i.e.*, by the beginning of the fourth day, the tympany was reported to be very acute and persistent, the animal becoming restless, lying down and getting up; some animals straining continuously, and passed loose motions sometimes tinged with blood. They become completely prostrate, had great dyspnoea and die after a few violent struggles. In some animals it was reported that there was haemorrhage from the nose after death.

Diagnosis.

Unpreserved skins were collected from nine dead animals and submitted to the Veterinary Investigation Officer, Madras for biological test against anthrax. The result of the test was reported *positive for anthrax*.

Local Treatment.

This is recorded as a matter of interest since the rationale behind the same could not be explained. The treatment given by the local quack to the affected animal was to make a small perforation on the left side midway between the fourth and the fifth ribs (counting from behind) with a small exploring needle and introduce hot oil (coconut or gingelly oil) into it, say about two to four ounces. The oil was poured into a cup-like enclosure, prepared out of dung around the exploring needle and it was slowly introduced in by the rotatory movement of the exploring needle. The idea behind this treatment as explained by the ryots, was to blister the spleen by means of the hot oil to prevent its enlargement! The percentage of recoveries, if it could be attributed to this treatment, worked up to 3 per cent in this outbreak.

Summary.

1. An outbreak of sub-acute Anthrax among cattle in a regular epidemic form is recorded.
2. Detailed symptoms of the sub-acute form of the disease is given.
3. No cases were recorded among buffaloes, sheep, goats or pigs.

Details of animals affected & died.

<i>Description of the animal</i>	<i>Age.</i>	<i>Date of attack</i>	<i>Date of death</i>
1. Bullock.	6. Years.	26-6-46.	29-6-46.
2. "	7. "	"	"
3. "	7. "	30-6-46.	2-7-46
4. "	6. "	"	"
5. "	5. "	"	"
6. "	6. "	1-7-46.	1-7-46.
7. "	7. "	2-7-46.	2-7-46.
8. "	6. "	"	"
9. "	7. "	16-7-46.	18-7-46.
10. Cow.	5. "	"	"
11. Bullock.	6. "	"	"
12. "	6. "	19-7-46.	23-7-46.
13. "	8. "	21-7-46.	25-7-46.
14. "	8. "	22-7-46.	"
15. "	6. "	"	"
16. "	5. "	"	"
17. "	8. "	"	"
18. "	7. "	24-7-47.	27-7-46.
19. "	7. "	"	"
20. "	7. "	"	28-7-46.
21. "	10. "	25-7-46.	"
22. "	9. "	"	"
23. Bull.	4. "	"	"
24. "	4. "	"	"
25. Bullock.	7. "	26-7-46.	"
26. "	8. "	28-7-46.	30-7-46.
27. "	8. "	"	"
28. "	7. "	29-7-46.	1-8-46.
29. "	8. "	"	1-8-46.

All the animals detailed above were of the local breed and all of them were reported to have shown all the symptoms detailed above except animals Nos. 6 and 7, which were reported to have died within 24 hours :

'CARBACHOL' IN VETERINARY PRACTICE.

BY

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Carbachol is a proprietary preparation of May & Baker's containing Carbamylcholine chloride, an analogue of Acetyl-choline, with almost similar pharmacological activity but with more pronounced parasympathetic stimulation. Further, this preparation is a more stable substance and more persistent in action, prepared for use in 0.1% w/v solution.

According to the manufacturers, Carbachol is indicated in cases where increased glandular and muscular activity of the alimentary tract is desired. It can also be employed successfully for 'toning up' an atonic pregnant uterus. Unlike Physostigmine and Arecoline, Carbachol does not produce any secondary effects on the heart but is contra-indicated in cases complicated with pulmonary affections like broken wind in horses and lung-worms in cattle.

The author has had great opportunities of using this agent in both equines and bovines with very encouraging results. A few cases treated at the Civil Veterinary Hospital, Shahjahanpur are detailed below:—

Case No. 1.—A young Indian-bred pony, in good condition, was brought for treatment with acute impaction of the colon. After giving an enema, an injection of Carbachol 2 c. c. was given, followed by another 1 c. c. after about 20 minutes. Immediately the animal evinced excessive salivation and some sweating. Within the next ten minutes, the bowels started acting slowly. The bladder also was emptied. The effects persisted for quite a long time resulting in almost total evacuation of the bowels. The animal had complete relief and was fit for work the next day.

Case No. 2.—A grown up, well-bred mare in fair condition suffering from flatulent colic was brought for treatment in a serious condition after about 14 hours of the onset of the complaint. Carbachol 4 c. c. was injected subcutaneously followed immediately by an enema. Profuse glandular secretions were seen within a few minutes. The bowels began to act and the animal was relieved of the flatulence in about 20 minutes. The mare appeared quite alright in about three hours, though somewhat exhausted.

Case No. 3.—An I.B. gelding, aged 4 years, with a history of acute constipation for about three days associated with slight colicky pains and scanty and high coloured urine. Full dose of oily purgatives administered earlier appeared to have had no effect; so also copious enemas. The animal

had a temperature of 103.2° and was occasionally looking towards the flank. The conjunctivae were rather dirty and the gait slightly unsteady at times. The animal was otherwise in good physical condition.

Carbachol 2 c. c. was injected subcutaneously, followed by another dose of 2 c. c. in about 15 minutes. The animal soon showed signs of intestinal action. It took just over two hours for the first small constipated mass to be evacuated. Copious enemas were then given and these were followed by gentle exercise. The horse had complete relief in 7 to 8 hours.

Case No.4.—A local-bred cow, aged about 5 years, with symptoms of acute oesophageal obstruction.

Carbachol 2 c. c. 'injected subcutaneously' produced profuse salivation within a few minutes. About 4 oz. of 01. Lini was given to the animal but hardly an ounce got in owing to the obstruction. In about 25 minutes, the animal was relieved of the obstruction and thereafter took plenty of water.

Case No.5.—A local-bred cow, primipara, aged 4 years, in good health, had difficulty in calving owing to uterine inertia. The presentation was normal.

Carbachol 3 c.c. was injected subcutaneously. Within ten minutes the animal had strong labour pains and, in 15 minutes, the calf was thrown out with a jerk, alive and in perfect condition. The after-birth also was expelled within another half an hour.

Case No. 6.—A fine local-bred draught bullock, aged 7 years, with acute impaction of the rumen, consequent on an accidental heavy feed of grams the previous day.

Carbachol 4 c. c. was injected subcutaneously. At first, apart from excessive glandular secretions, no immediate apparent relief was evinced. After 3 hours, the hard impacted mass in the rumen appeared much softer on manipulation and some feeble ruminal movements were also discernible. In about another hour, the bowels started moving and the evacuations lasted about 6 hours. During this time the animal appeared thirsty and was given water in small quantities frequently. There was complete relief to the animal within 24 hours.

Case No. 7.—A young milch-cow with history of chronic dyspepsia extending over a long period and recurring at frequent intervals. Routine hospital medication did not succeed beyond affording temporary relief; condition of the animal was steadily going down

An injection of Carbachol 2 c. c. subcutaneously was given the first day. This was followed after an hour with a moderate dose of saline

purgative dose. The owner was advised to feed the animal judiciously on easily digestible laxative food for a few days till the treatment was complete. The injection was repeated the next day and also the salines in smaller doses. On the third day, Carbachol 1 c. c. was again injected followed by a still smaller dose of salines as before. The treatment was stopped thereafter. Beyond careful attention to diet nothing more was done.

Information received after three months showed that the animal had greatly improved in general health with no recurrence of the complaint.

In many other similar cases, and more especially in the various forms of colic in horses and impaction of rumen in cattle, the drug was extensively used and results obtained were very satisfactory. In cases of tympanities in cattle, however, the results have been variable.

PHENAMIDINE ISETHIONATE, M. & B, IN B. CANIS.

BY

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Veterinary Officer, Gwalior Kennels, Gwalior.

Phenamidine, a recent preparation of May & Baker's, has been tested by Lourien and Yorke and found to be very effective in B. Canis. It is supplied by the makers in 5 percent solution for parenteral administration. This preparation was tried on a case of B. Canis with good results. The subject of the case was a smooth-coated Fox Terrier dog and the blood examination proved positive for B. Canis.

A subcutaneous injection of 4 c. c. of this drug was given on the first day, the dosage being calculated at the rate of 9.3 c. c. per kgm-body weight of the animal. The drug was well tolerated by the patient without any local reaction and no toxic effects were noticed. The temperature dropped to 102° F the next day, but appetite remained in abeyance. The general condition of the patient was however fairly good. On the third day, the temperature was 103° F throughout and the bowels were costive. A dose of Hydragri Subchloride with Sodii Bicarb was administered. On the fourth day, another injection of 4 c. c. Phenamidine Isethionate 5 per cent solution was repeated as the patient recorded a temperature of 104° F. The dog refused milk bread and broth that day, but a saucer of custard pudding was found an appetizing dish. On the fifth day, the patient appeared quite lively with a normal temperature and with signs of general improvement towards recovery. The treatment thereafter consisted of a tonic mixture containing Acid Hydrochlor dil, Nux Vomica and Gentian for a couple of days, with careful and judicious feeding and nursing during convalescent period.

Correspondence

[The views expressed in letters addressed to the Editor represent the personal views of the writer and must not be taken as expressing the opinion or having received the approval of the A.I.V.A.]

Rinderpest Inoculation during Foot and Mouth Disease and prophylactic inoculation against Rinderpest.

Sir,

On 6th February 1938 after having arranged for vaccination of cattle against Rinderpest, I arrived at village Karzam under Jaintia Police Station in the Sylhet District. On arrival I found that Foot and Mouth Disease had broken out in the area and that 15 per cent of the cattle of the area Karzam, and challain were actually suffering from the disease. The owners of animals however pressed me for Rinderpest vaccination on the ground that protection of animals against Rinderpest was badly needed. I therefore vaccinated on 7th February 1938, all the animals that had not become affected with Foot and Mouth disease, numbering 360 in the two villages (Karmam and Challain. I re-visited the village on 17-2-43 and found that 30 per cent of of the vaccinated cattle had reacted but none of them had any attack of Foot and Mouth disease. This was rather interesting and, with a view to test it again, I vaccinated 575 cattle in the village Kandizam, Shahpur and Turbham on 22-2-43 and 23-2-43 in the face of Foot and Mouth epidemic. Here also I found the result to be same viz, that the animals vaccinated with Goat Tissue vaccine against Rinderpest did not contract the Foot and Mouth disease which was prevailing in the locality at the time.

Sylhet. }
15-2-47 }

Mahendra Chandra Paul, G.B.V.C.,
Itinerant Veterinary Assistant Surgeon, Sylhet, Assam.

A CASE FOR DIAGNOSIS.

We were called in recently to see an Ongole bullock, aged about 11 years, suffering from a thick hard swelling (not pitting on pressure), extending from about the middle of third of the dewlap to the scrotum and down to the knees. The swelling developed gradually starting from the brisket and in about ten days time, the swelling increased to the above mentioned extent. The animal had been off-feed and the bowels were constipated. During these ten days the animal was under treatment by the Go-Vaidyas of the village. At the time of our visit, the animal was dull and depressed with inability to shift from its standing posture.

The temperature was 103.2° F and the respirations more abdominal. The urine was high-coloured and passed in small quantities and at frequent intervals. The animal was cast down slowly for an examination per rectum, and this recumbent position, even before securing the limbs, caused acute dyspnoea. Microscopical examination of blood smears and dung was negative.

Treatment.—With a grave prognosis, the animal was given the following mixture and powders after an intramuscular injection of 20 c.c. of Lugol's Iodine.

R/			R/
Pot. Iodide	dr VI	Mağ. Sulph.	oz III
Tr. Digitalis		Ammon. Chlor	
Tr. Nucis Vomica	oz I	Pot. Nitrates aa	dr II
Tr. Calumba	„ II	Hexamine	„ II
Aqua ad	„ XVI	Ft. Pul. 1 Mitte 4, Sig. One powder	
Ft. Mist. Sig. $\frac{1}{4}$ part B.I.D.		B.I.D. as electuary.	

The swelling got reduced considerably by the third day. The animal was able to pass urine freely and was having loose dung. There was slight rumination and the animal was able to lie down and get up, though with difficulty. The following mixture was given and was repeated once:—

R/	
Ammon. Carb.	oz I
Pot. Acetas	dr IV
Pot. Iodide	„ IV
Tr. Digitalis	„ VI
Tr. Nucis Vom	„ IV
Tr. Gentian Co.	
Tr. Zingiber aa	oz II
Aqua Chloroformi ad	„ XVI
Ft. Mist. $\frac{1}{4}$ part B.I.D.	

The animal is now quite healthy but still weak for work.

Bapatla, }
20-5-47 }

Y. Ramanujam, G.M.V.C.
V. Gurumurti, G.M.V.C.

Agricultural College, Bapatla.

LIVESTOCK IMPROVEMENT AND VETERINARY AID IN BAMRA STATE

Sir,

It is a matter of great pleasure that though Bamra state is a very small one with a limited income, good work has been done towards the improvement of the livestock and the rendering of veterinary aid through the patronage of the Ruler.

The Veterinary Dispensory is, I think, one of the oldest institutions in Eastern States Agency and has been in existence with a skeleton staff since 1896. It has now been given a new lease of life by the present Ruler who has expanded and equipped it well.

The present veterinary staff consists of one veterinary surgeon, one trained compounder, one dresser and six stockmen with the usual office orderlies and menials. The stockmen who were appointed last year on the proposal of the Veterinary Assistant surgeon are located in six thanas on the outskirts of the state boundary with necessary medicines, instruments an inoculating outfit. Their duties are to tour within their allotted jurisdiction, whether there are epidemic diseases or not, and to instruct the villagers on matters of Animal Husbandry, especially on housing, feeding and breeding and also to inoculate all the animals with Goat-Tissue-Vaccine. Two veterinary outposts have been established in two sub-divisions and they are in charge of the stockmen. Quarantine houses have also been constructed to keep the animals under observation during epidemics. A three-year plan has been drawn up to inoculate all the animals of the state with Goat-Tissue-vaccine and thus put an end to outbreaks of Rinderpest. To supervise and check the work of the stockmen, the V.A.S., is on tour for 15 days in a month. By this arrangement, the work is going on efficiently and there are already signs of the epidemics coming under control; this year there were only two outbreaks of Rinderpest with only very small mortality as against 10-12 outbreaks in previous years with a high degree of mortality.

Finance.—The finances of the department have also been quadrupled. Before the year 1940, the allotment was Rs. 1893 with only Rs. 500 for medicines but now it is Rs. 5386 with Rs. 2000 for medicines.

The people of the state have begun to realise the benefits of the department and are becoming very interested in its activity.

On the Animal Husbandry side, a dairy was established in the year 1938 under the direct charge of the veterinary surgeon. 20 Sindhi and 5 Haryana cows and 4 Sindhi bulls were purchased while one Haryana bull was presented by the Viceroy Lord Linlithgow to the Ruler of the State for

improving the breed of cattle in the State. Out of these bulls, 2 were stationed in 2 sub divisions and 2 Sindhi bulls and Hariana along with the 25 cows were kept in the dairy farm. As a result of this, the cattle in those 2 sub divisions and in the *sadar* have been graded up and, in my present tour in those two sub-divisions, I had an ocular proof of it. This naturally led to a demand for good breeding bulls from the other sub-divisions. 10 bulls were distributed to local people in the year 1941 and they were placed in a central village under the care of the headman of the village for the use of the cows of the surrounding villages. Unfortunately, 5 bulls died for lack of care. To reduce the strength of the farm and also to help the state subjects, 23 heifers and 10 bulls were distributed to local people. 5 bulls were replaced in those 5 centres which had lost the animals while the other five were located in fresh centres.

Some bulls which were unfit for breeding were castrated and were used in the State-garden. Again in the year 1946, 10 bulls were distributed for breeding purposes. Thus the total number of breeding centres at present, besides the *sadar* and in two sub divisions, is 25. The local breed of cattle has been improved by these measures and cross-Sindhi cows and heifers and bulls can be found throughout the State. In the year 1945, 6 Murrah buffalows were purchased for improving the buffaloes in the State. The present strength of the farm is 102 and is running very smoothly and efficiently. The milk yield per day is $1\frac{1}{2}$ maunds.

A scheme has been approved to start a State-Breeding Farm in a place with plenty of pasture land. The site has been selected and the work will be undertaken after the rainy season is over. The farm will undertake to breed good stock and distribute the seed bulls in the villages.

Great credit is due to the Development Member Mr. H. P. Deb for his live interest in livestock work. He has been responsible for putting forward the various improvements to the Ruler and for carrying them out.

Niranjan Gountia,
Veterinary Assistant Surgeon, Bamra State, E.S.A.

DEHORNING OF CATTLE IN THE TANJORE DELTA.

This article is written with a view to make the Veterinary Surgeons interested in the operation of dehorning of cattle and to put it on a scientific basis from its present stage of quackery.

It is extensively carried out in Tirutturaippundi Taluq, the birth-place of the famous Umblachery breed, although it is practised widely in the whole of the delta area from a long time past. The chief objects for which the operation is carried out, are to minimise the danger caused by these animals when they are in a herd. Ordinarily these animals are fiery tempered and easily cause injuries by their horns as well as to their horns. To avoid this they are dehorned at an early age. It is also said that dehorning improves the build of the animal, and to give a better shape to the head in an otherwise ugly head with a symmetrical horns. How far these claims are true can be judged by the fact that only males are dehorned and the female stock is left with the horns intact! The operation is done when the animals are nine months old, although occasionally it is done on older animals. The animal is cast and secured, a red hot iron is applied over the seat of the horn and the part thoroughly singed. The after treatment is only to keep the part free from flies and maggots and, to encourage the healing, *Neem* oil is the common dressing used. Common complications are extensive inflammation of the cauterised area, maggot infection, and opening out of the frontal Sinus. These take weeks and months to get healed and the animal suffers a lot meanwhile.

To avoid all these sufferings and complications, it is my earnest suggestion that the Veterinary Surgeons in the Deltaic tract, should undertake to do this operation themselves and take it out of the hands of the quacks. The calves to be dehorned should undergo the operation during the first week or fortnight after birth and the seat of horn should be cauterised with caustic potash. This method is practically painless and causes no suffering to the animal. No complications are likely to ensue and the part will heal in a very short time leaving very little blemish behind.

In grown up animals where the chemical cautery cannot be used thermal cautery may be applied judiciously after nerve blocking.

George Ebenezer.

BOVINE SURRA: AN OCCASIONAL CONDITION—WRY NECK

A detailed study of the disease has been published in the *Indian Veterinary Journal*, January issue by two eminent workers.

In this brief note I desire to draw attention to a condition of "wry neck" exhibited by bovines suffering from surra. In about 20 sub-acute cases of surra, I have observed the "wry neck" during the febrile stage and in some after Antimonium Tartaratum injections.

Treatment:—These cases have been treated successfully by administration of Calcium chloride in addition to an usual Antimony Tartarate treatment. I have been using for this purpose, Calcium Chloride in doses of 2 to 3 drachms in 40 to 60 c. c. of distilled water intravenously three to four hours after the Antimonium injection. Usually the wry neck is relieved in six hours after the calcium injection. Sometimes where the condition persists, it has been found necessary to repeat the calcium on successive days.

The mortality in these animals treated with calcium is much less than those cases that did not receive such a treatment.

The incidence of wry neck in Surra has not been encountered by me in other districts.

Tiruthuraipoondi. }
27-4-47

George Ebenezer,
Veterinary Assistant Surgeon.

Abstracts

STUDIES ON ANTIRABIC IMMUNIZATION WITH CULTURE VACCINE

BY

N. VEERARAGHAVAN

(Abstract from *Indian Journal Medical Research*. Vol XXXIV, p. 225-236)

One of the problems in rabies is to evolve a refined Vaccine of a greater immunizing value that could be given in smaller doses over a shorter period of time and which would be free from possible by-effects such as paralytic accidents. The chief defects with the present 5% Semple's Vaccine used in India are the following:—(1) the virus content of the vaccine is not known and shows a considerable degree of variation, (2) the antirabic vaccine contains a large amount of nerve tissue which is unlikely by itself to have any antigenic value but believed to be the cause of

neuroparalytic accidents, and (3) the vaccine is administered in large doses over a relatively long period and it is therefore cumbersome both to the patient and the medical attendant. Most of the defects of this Vaccine could be remedied if the virus could be obtained in high concentration in cultures *in vitro*. Although attempts have been made to use a culture virus, from a practical point of view it has been considered so far not a satisfactory source of rabies vaccine mainly due to the low virus content obtained in cultures.

The author has recorded elsewhere that it is possible to obtain high concentrations of the virus in cultures with a medium containing sheep brain extract, sheep serum, glycerine and peptone, with or without the addition of young guinea-pig nerve tissue. This paper deals with the technique and experimental data connected with the preparation and standardisation of a culture vaccine utilising the above medium. A comparative study of this vaccine with the existing method was also made.

For the various immunity experiments described, the vaccine was prepared by using a culture medium for which the addition of young guinea-pig nerve tissue was necessary. The author shows that the maximum concentration of the virus that could be obtained by this method is not more than 75,000 m.l.d. per m.l., estimated by biological assay with guinea-pigs. But an improved method is evolved later by which it is possible to obtain a concentration as high as 2,500,000 m.l.d. per m.l. in cultures, with a medium containing 1.5% sheep brain extract, 2% sheep serum, 2.5% glycine, and 0.15% peptone without the addition of fresh guinea-pig nerve tissue. The following is the method by which the vaccine was prepared:—

Thirty m.l. of 10 per cent sheep brain extract, 4 m.l. of sheep-serum, 25 m.l. of 20 per cent glycine, 20 m.l. of 1.5 per cent peptone and 101 m.l. of distilled water were placed in a flask. Thirtysix m.l. of the supernatant from a centrifuged 20 per cent suspension of fixed virus sheep brain were added to the flask. The flask was incubated at 37° c. under strict anaerobic conditions in a McKintosh and Filde's Jav. After 24 hours incubation the virus content of the culture was titrated in guinea-pig. Adequate amount of 10 per cent carbolic acid were then added to the culture so that the final concentration of the acid was 0.5 per cent. After the addition of carbolic acid, the culture was incubated at 37° c. for 72 hours. After 72 hours incubation, the undiluted culture was inoculated subdurally into at least two guinea-pigs in order to find out if the virus was killed.

The preparation of the vaccine is not difficult and all the ingredients used in the culture medium can be readily obtained. It is pointed out that the virus content of the inoculum used, should be high to obtain satisfactory concentration of the virus and the author records uniformly high concentration of virus by utilising the supernatant from a centrifuged 20 per cent suspension of a fixed virus sheep brain which is also the basis for the Semple's vaccine. Instead of one per cent carbolic acid used for inactivation of virus in Semple's vaccine, only half per cent carbolic acid is employed for killing the virus in the culture vaccine. It has been shown that the virus content of the infected sheep brain used for Semple's vaccine exhibits a marked variation ranging from 10,000 m.l.d. per m.l. to a

maximum of 100,000 m.l.d. per m.l. and the author points out that it is possible to obtain a consistently high concentration of 2,500,000 m.l.d. per m.l. in the cultures. While there is no sound method of standardisation of the virus content of the Semple's vaccine, the virus content of the culture vaccine can be determined by biological assay and can be expressed in terms of m.l.d. per m.l. All the virus in the culture vaccine is in a relatively free state and is readily available for exerting its antigenic value. The protein nitrogen content of undiluted culture in spite of its high virus content is only 80 % that of the phenol vaccine and the non protein nitrogen content of the culture vaccine is about 37 times more than the Semple's vaccine which is mainly due to its high glycine content. The glycine present in the vaccine is considered to have only a beneficial effect, since it is administered in large doses in muscular dystrophies with good results. Experimental evidence cited in the article reveals that the culture vaccine with its virus content adjusted to be equal to that of 5% phenol vaccine will produce a fairly satisfactory production against the disease, while further dilution to half this level shows a marked decrease in the immunological response. The immunising value of undiluted culture vaccine containing about 3.5 times the virus content of phenol vaccine has not appeared to be superior to that of the phenol vaccine. This indicates that after a certain limit the immunological response of an animal cannot be increased by increasing the amount of virus given.

The author cites evidence to show that when 5 times the comparable doses per gramme of body weight of phenol vaccine a culture vaccine with the same virus content is given intraperitoneally to guinea pigs and rabbits, considerably higher degree of immunity is produced than by the existing dosage. If a proportionate increase in the dosage of 5% phenol vaccine to produce a greater degree of immunity is contemplated, then the dosage of the vaccine for human beings will be 700 m.l., which from a practical point of view is not feasible. But with the culture vaccine containing 100 times the virus content of phenol vaccine it is possible to administer the whole quantity of virus in 7 m.l. Although the exact dosage and the duration of the treatment have not been worked out, it is suggested that it is possible to reduce both the duration and the dosage by utilising the culture vaccine. The nerve tissue proteins which are generally held to be responsible for the post-vaccinal paralysis with the phenol vaccine, from only 1/50th in the culture vaccine of that present in one course of phenol vaccine.

The culture vaccine is claimed to be apparently free from any toxicity even when administered intra peritoneally to experimental animals and the author points out that the local reaction of redness and in duration at the site of injection frequently observed after administration of phenol vaccine is not shown by using the culture vaccine.

Since it is possible to prepare 30 m.l. of culture vaccine from one gram of fixed virus sheep brain, with the reduction in dosage as indicated above, it is possible to prepare thirty times as many courses of culture vaccine from one sheep as that of phenol vaccine, which would mean a marked reduction in the cost of production.

(D.K.M.)

Multiplication of *B. Anthracis*, *Cl. Chauvoei* and *Pasteurella* in Animal carcasses with a note on the rate of cooling of carcasses.—
By F. C. Minett.

In the case of *Pasteurella* and *Cl. chauvoei*, the organisms continue to multiply in the body for some hours after death. Some quantitative data to this effect are provided, based on cultural examination of tissues removed immediately after death and again after the carcass had been stored at air temperatures of 60-70° F. or above. The tissue mostly used was bone-marrow, since it can be easily manipulated. With black-quarter, the microscopical examination of such materials agrees with the cultural findings.

With black-quarter in sheep guinea pigs, at the time of death the organisms outside the lesion of inoculation are usually in the vegetative state. After some increase in numbers—of variable degree but some times 50-to 230-fold—they sporulate. If death is delayed, some may have already sporulated before death. The fresh local lesion contains enormous numbers of spores; a culture may develop from an amount estimated at 0.0000001 gm.

With acute pasteurellosis in rabbits the organisms continue to multiply in the bone-marrow during the first six hours, after which their numbers appear to remain stationary up to about 48 hours when they begin to decline. At the peak, the numbers may run to over 2,000 million per gm.

With anthrax, cultural results were erratic and there was no evidence that post-mortem multiplication is a constant feature.

Multiplication of pathogenic bacteria in the carcass is no doubt favoured by a warmer atmosphere, since body cooling will be retarded. Some data on the rate of cooling of carcass of different sizes are provided.

Indian J. Vet. Sci. & Anim. Husb. Vol. XV, Part II.

Studies on the composition of the blood of farm animals in India.—By A. K. Pal, S. A. Momin and D. N. Mullick.

Whole-blood and serum of a group of normal cows were analysed for morphological and chemical constituents over a period of 12 months.

Oxalated blood was examined for red cells, white cells, haemoglobin, cell-volume, iron, inorganic phosphorus, cell-volume, iron, inorganic phosphorus, sugar and cholesterol. Calcium, magnesium, protein and non-protein nitrogen were determined in serum. Different corpuscular values were calculated from red cell counts, haemoglobin and cell volume. In the morphological series, haemoglobin and cell-volume exhibited significant seasonal variations, whereas in the chemical series monthly averages for iron calcium and magnesium showed significant differences. In the former series, the average values were highest in winter, whereas in the latter series they

were highest in summer. The remaining constituents, both in the morphological and chemical series, showed no significant differences in their monthly averages. Practically all the constituents differed significantly in individual animals.

Indian J. Vet. Sci. & Anim. Husb. Vol. X, Part II.

Bagomolasses as cattle feed, Digestibility and nutritive value of Bagomolasses.—By S. C. Ray and S. K. Talapatra.

With the extensive development of sugar industry in this country, the economic disposal of a large quantity of molasses in every crushing season has become a problem for urgent consideration. Of late, attempts have been made to open up several avenues of economic utilization of molasses. One of these is its possible use as a cattle-feed.

The Imperial Institute of Sugar Technology had been, for some time past, manufacturing a cattle feed containing a substantial quantity of molasses. It was prepared by mixing dried bagasse screenings and protein concentrate (made of *chunni* and an oilcake) with boiled molasses. The mixture was pressed into a cake and was named as 'molasscuit'. Some feeding tests with molasscuit were carried out at several centres. Preliminary reports of these trials were somewhat contradictory as to the suitability of molasscuit as a cattle feed. The manufacture of molassed feed containing protein concentrate was eventually dropped and the Imperial Institute of Sugar Technology is now producing a new feed very similar to the foregoing in general make up but containing no protein supplement. The new feed has been named 'bagomolasses', and is made up of one part bagasse screening mixed with two parts of molasses.

Bagomolasses as a feed for cattle is quite palatable if it is fed after being mixed with a concentrate like wheat bran and soaked in water a few hours previous to feeding.

The feeding of bagomolasses induces a considerable amount of diuresis which can be counteracted in large measure if common salt is freely provided.

The incorporation of bagomolasses in the maintenance ration of bullocks does not apparently affect the digestion of any constituent excepting protein. The protein digestibility is slightly depressed.

The utilisation of nitrogen, lime and phosphate is not affected when bagomolasses is incorporated in a maintenance ration of bullocks.

Bagomolasses does not contain any digestible protein or ether-extract. The digestibility coefficient of its total carbohydrates is 72. From the values of digestibility coefficients determined, the total digestible nutrients and starch equivalent calculated per 100 lb. of the raw material are 47.0 lb., and 36.9 lb. of the raw material are 47.0 lb. and 36.9 lb. respectively. In nutritive value, bagomolasses is thus comparable to gram husk.

An inadequate village ration for working bullocks can be improved by supplementing with bagomolasses without inducing any bad effect on the health. The higher retention of nitrogen in the supplemented feeding suggests that when the energy-deficient typical village ration is fortified by adequate amounts of energy-giving food like bagomolasses, the necessity for the costly protein concentrate can be considerably curtailed.

In an adequate ration of working bullocks gram husk can be economically substituted with bagomolasses without any ill-effects on the animals.

The health and working capacity of animals receiving bagomolasses to the extent of 18 per cent to 27 per cent dry matter in the ration compared well with those of the control groups during a short-term experiment.

Indian J. Vety. Sci. & Anim. Husb. Vol. XV, Part II.

Transmission of Pasteurellosis by the Fleas (*Ctenocephalides Felis*)—By S. N. Sapre.

Experiments on transmission of *P. septica* from rabbit to rabbit and from rabbit to buffalo were tried using *C. Felis*, the common dog flea. The experiments in rabbits were positive and a very small number of fleas was effective. On the other hand, in 11 experiments with buffaloes and up to 3,000 fleas as transmitting agents eight failed completely, one was positive and two were doubtful. Since most of the experiments with buffaloes were negative in spite of optimum conditions as regards the number of fleas and high virulence of the organism, it seems unlikely that in practice *Pasteurella* in bovines is transmitted by the class of insect. *Pasteurella* was found in the faeces of fleas fed on infected rabbits and then fasted for 43 hours. The organism was also found in the bodies of infected fleas which have been fasted for at least 72 hours.

Indian J. Vety. Sci. & Anim. Husb. Vol. XV, Part II.

Studies on Newcastle (Ranikhet) Disease Virus Strain differences in amenability to attenuation—By S. Ganapathy Iyer and Z. A. Hashmi.

Details are given of the behaviour of three Indian strains of Ranikhet disease virus during successive egg-passages. Two strains, Lines i and iii showed no evidence of attenuation after 69 and 32 passages respectively, while a third, Line ii was attenuated after 19 passages.

From 19th to 28th passages Line ii virus had no apparent harmful effect when injected into fowls and rendered them immune to test doses of different strains of virulent Ranikhet disease virus.

From the 29th passage onward, the attenuated virus gave irregular results. Frequently out of two fowls receiving a similar inoculum one died and the other survived, suggesting resuscitation of latent conditions and indicating the necessity of further work.

Indian J. Vety. Sci. & Anim. Husb. Vol. XV, Part, II.

The occurrence and spread of Fowl Cholera in India.—By S. Ganapathy Iyer and Z. A. Hashmi.

A three years' survey of the incidence of fowl cholera in India suggests that fowl cholera occurs far less frequently than is usually believed and that widespread epizootics are not a feature of the disease.

In one outbreak, the disease was observed to run a typically enzootic course. The presence of carriers to the extent of 4.06 per cent among apparently healthy fowls was established and they were even found in seemingly unaffected pens.

Pathogenicity tests showed that about one-quarter of the strains of *Pasteurella* isolated from carriers were virulent for the fowl and nearly one-half for the rabbit. Examination of another lot of fowls from the same farm, 21 months after the last clinical case of fowl cholera, again revealed the existence of carriers to the extent of 1.4 per cent.

Indian J. Vety. Sci. & Anim. Husb. Vol. XV, Part II.

Animal Nutrition Problem in Bengal.—By Indubhusan Chatterjee, M. Sc. (Agr.), L. A.

The limitations forming the special feature of Bengal with regard to the problems of animal nutrition have been discussed,

The general feeding value of rice straw has been dealt with.

Since the straw is highly unbalanced, it is not properly utilized unless it is fed with more nutritious supplement.

The soil condition and environment exercise a profound influence on general as well as specific characters of the straw in an area.

In order to get dependable results, feeding and metabolic tests should be conducted with local animals under local conditions of feeding.

Rice straw contains an appreciable amount of oxalic acid which has the property of keeping lime in an insoluble form. This substance has been found to vary according to soil and climate. A large amount of potash as found in raw rice is another factor causing disturbance in lime metabolism. In order that removal of these substances could be effectively carried out several methods have been suggested.

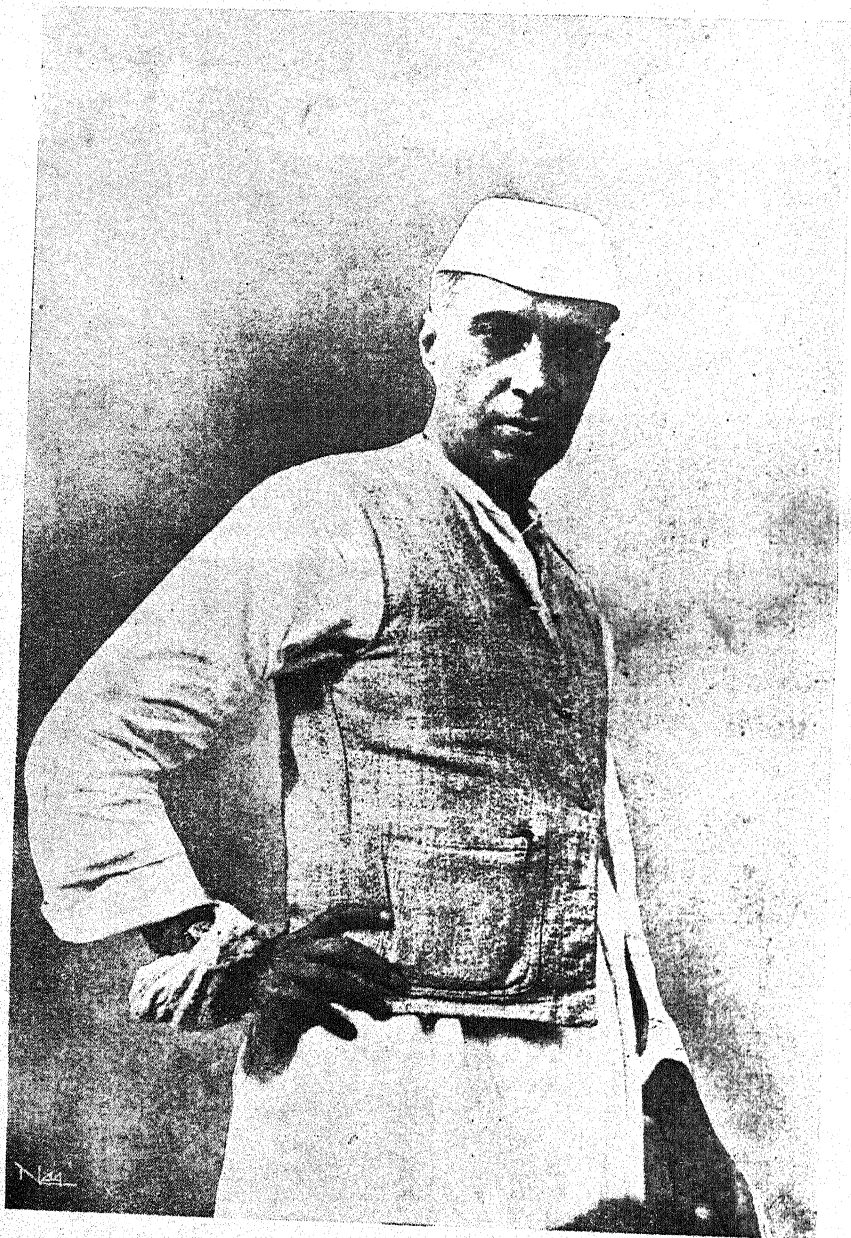
Mustard cake in combination with raw rice straw gave satisfactory results as regards protein and many other components. But the excess drainage of potash under its combination is an unsatisfactory feature. An excess drainage of potash will be avoided by feeding raw rice straw with other concentrates than mustard cake.

Preliminary work on the utilizability of rice-kura and rice by-products as cattle feed was also undertaken.

Indian J. Vety. Sci. & Anim. Husb. Vol. XV, Part II.



MAHATHMA GANDHI,
The Architect of Indian Freedom.



PANDIT JAWAHARLAL NEHRU,
The First Prime Minister of Free India.

Pandit Jawaharlal Nehru's call to the Nation

The Appointed Day has come—the day appointed by destiny, and India stands forth again after long slumber and struggle—awake, vital, free and independent. The past clings on to us still in some measure and we have to do much before we redeem the pledges we have so often taken. Yet the turning point is past, history begins anew for us, the history which we shall live and act, and others will write about.

It is a fateful moment for us in India, for all Asia and for the world. A new star rises, the star of freedom in the East, a new hope comes into being, a vision long cherished materialises. May the star never set and that hope never be betrayed.

We rejoice in that freedom, even though clouds surround us, and many of our people are sorrow-stricken and difficult problems encompass us. But freedom brings responsibilities and burdens and we have to face them in the spirit of a free and disciplined people.

On this day our first thoughts go to the Architect of this freedom, the Father of our Nation who, embodying the old spirit of India, held aloft the torch of freedom and lighted up the darkness that surrounded us. We have often been unworthy followers of his and have strayed from his message, but not only we, but succeeding generations, will remember this message and bear the imprint in their hearts of this great son of India, magnificent in his faith and strength and courage and humility. We shall never allow that torch of freedom to be blown out, however high the wind or stormy the tempest.

Our next thoughts must be of the unknown volunteers and soldiers of freedom who, without praise or reward, have served India even unto death.

We think also of our brothers and sisters who have been cut off from us by political boundaries and who unhappily cannot share at present in the freedom that has come. They are of us and will remain of us whatever may happen, and we shall be sharers in their good and ill fortune alike.

The future beckons to us. Whither do we go and what shall be our endeavour? To bring freedom and opportunity to the common man, to the peasants and workers of India. To fight and end poverty and ignorance and disease. To build up a prosperous, democratic and progressive nation, and to create social, economic and political institutions which will ensure justice and fullness of life to every man and woman.

We have hard work ahead. There is no resting for any one of us till we redeem our pledge in full, till we make all the people of India what destiny intended them to be. We are citizens of a great country, on the verge of bold advance, and we have to live up to that high standard. All of us to whatever religion we may belong are equally the children of India with equal rights, privileges and obligations. We cannot encourage communalism or narrow-mindedness, for no nation can be great whose people are narrow in thought or in action.

To the nations and peoples of the world we send greetings and pledge ourselves to co-operate with them in furthering peace, freedom and democracy.

And to India, our much-loved motherland, the ancient, the eternal and the ever-new, we pay our reverent homage and we bind ourselves afresh to her service.

THE INDIAN VETERINARY JOURNAL

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General Articles.

AN UNIQUE EXPERIENCE.

BY

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Madras.

Going over my professional jottings, I have come across the following interesting record, which, for some inexplicable reason, has remained unpublished till now.

On the 3rd April 1925, the Sub Inspector of Police, Kandal, a suburb of Ootacamund in South India, sent me seven carcasses of sheep and three live sheep with injuries, for examination and report on the cause of the deaths and the nature of the injuries. The history given was that the animals had been locked in during the night as usual in a perfectly healthy condition and that, on opening the place the next morning, a number of animals were found dead, while a few others had injuries on them.

On post-mortem examination, 4 sheep had dislocation of the 2nd cervical vertebrae while 3 had compound comminuted fracture of the cranial vault. The fractured pieces of bone had entered into the substance of the brain.

The injuries on the live animals were simple and consisted of long incised wounds, not of a deep nature, on the neck; two had torn ears.

A visit to the place of the incident showed that a flock of about 30 sheep was kept in the outskirts of the village in a walled-in tiled building and that, as usual, the animals were brought in the previous evening after grazing and locked in for the night. Besides the main doorway, there were two windows, 4'x3', on the sides of the building at a height of about 5

feet from the ground and they had neither doors nor cross-bars. Next morning, when the servant opened the door to let out the animals, a terrible sight was on view with dead and injured animals.

Naturally everyone was aghast at this and the owner's suspicion fell on a near relation of his, as the instigator of this slaughter, because they were on inimical terms. I could not imagine any human being to be so very perverted as to pole-hammer, or twist the necks of, so many innocent sheep and so I ruled that out. At the same time I could not unravel the mystery attending these deaths. I, therefore, had a consultation with Dr. H. E. Browne, an experienced Veterinary Surgeon practising at Ootacamund. The moment he heard my history of the case, he came out with his diagnosis and gave it out with an emphatic assertion. He also described very graphically the manner in which the fatal injuries should have been inflicted. Evidently it was all the result of his extensive *Shikar* in his younger days. In short, according to Dr. Browne, the deaths had been caused by a Tigress teaching her cub, or cubs how to kill sheep. I was rather sceptic about this opinion, but very soon got disillusioned when on my way back home, I heard the gossip of the town that a tigress had been located in a shola (a thickly wooded jungle) adjacent to the town. By evening, the shikaries had shot that tigress and also 2 cubs and were parading the trophies in their usual way.

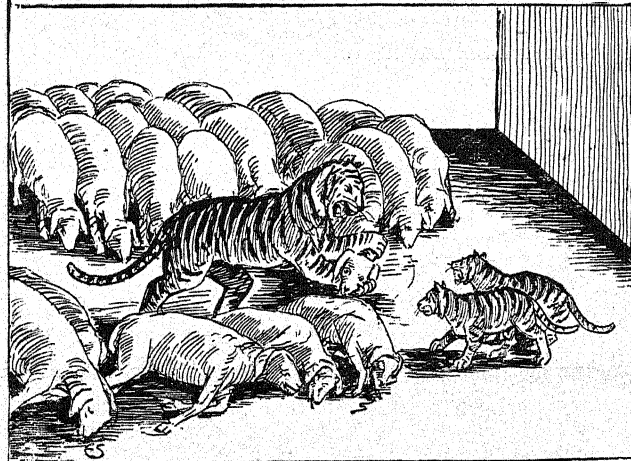
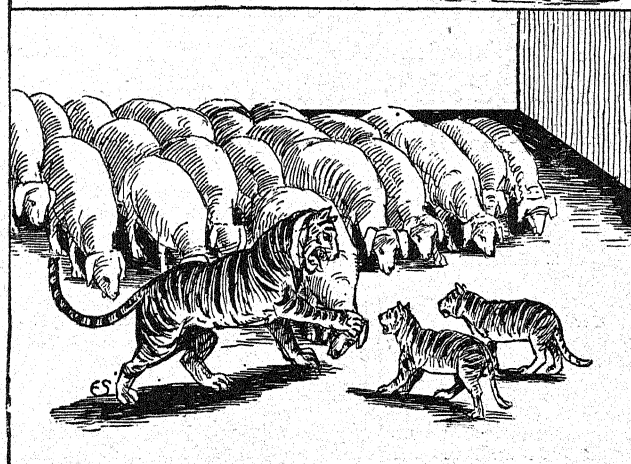
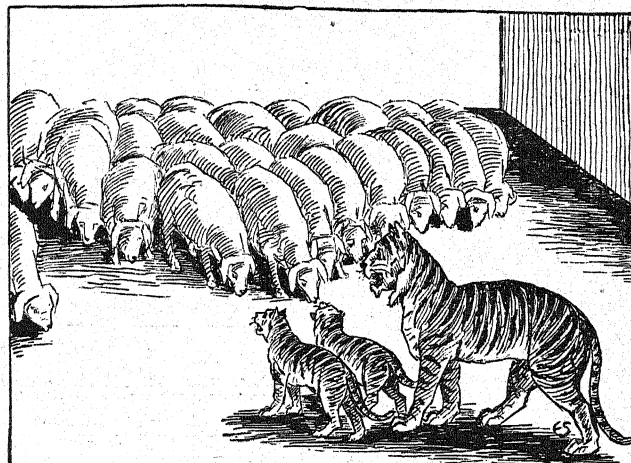
According to Dr. Browne, the tigress must have been teaching her cubs in the following manner after having got into the building through one of the side-windows.

A subsequent examination of the pen revealed the hairs of the tigress sticking on the sides of a side-window, as evidently she had to squeeze herself in through the narrow opening.

The moment the sheep see the tigress, they run helter-skelter, and then sheep-like, gather together in a corner of the enclosure. The tigress with her cubs stands in front of them practically hypnotising them to a standstill with her luminous eyes. Then, sitting on the haunches, she dislocates the neck of the animals, with one front leg on the side of the neck and the other leg on the opposite cheek. Alternatively, the sheep is hit violently on the head by the powerful paw of the tigress. In either case the death is instantaneous.

An extraordinary lesson, it may be said! Yes, it is indeed extraordinary. It appears, it is unusual for a tigress to spoil the sanctity of the school by having a meal there after the lesson is taught! or it may be she scents some disturbance by a prolonged stay in the school. The injuries on the sheep might have been caused by the young cubs in their attempts of practising the lessons on the victims.

**SHEEP AND THE TIGRESS—DEMONSTRATION OF KILLING
BY THE LATTER TO HER CUBS.**



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A MARK TO REMEMBER

The above incident, while it is highly revealing, illustrates the dictum of old *viz.*, "what we know is only just a handful, what we do not know is as vast as the world."

The enclosed three text figures may give the readers an idea of how the tigress is said to teach her cubs in the art of killing sheep.

**A CHECK-LIST OF PARASITES, (CLASS—NEMATODA)
IN THE DEPARTMENT OF PARASITOLOGY,
MADRAS VETERINARY COLLEGE LABORATORY.**

(Continued from Page No. 434, Vol. XXIII.)

BY

S. V. MUDALIAR, G. M. V. C.

(Lecturer in Parasitology, Madras Veterinary College)

AND

V. S. ALWAR, B.V.Sc.

(Assistant, Department of Parasitology)

PHYLUM NEMATHELMINTHES Voigt (quoted by Carus, 1863)

Class *NEMATODA* Rudolphi, 1808.

Order *ASCARIDEA* Railliet and Henry, 1915.

Family *ASCARIDAE* Baird, 1853.

Genus *Ascaris* Linnaeus, 1758.

A. lumbricoides Linnaeus, 1758.

Host. man.

Location. Intestine (passed in faeces)

Locality. Madras. (1932)

A. lumbricoides (suis) Linnaeus, 1758.

Host. Pig.

Location. Intestine.

Locality. Malay States. Butterworth (1937)

A. vitulorum Goeze, 1782.

Host. Calf.

Location. Intestine.

Locality. Madras. (1922)

A. equorum Goeze, 1782.

Host. Horse.

Location. Intestine.

Locality. Madras (1922)

A. sp.

Host. Brown bear, bandicoot, mountain squirrel.

Location. Intestine.

Locality. Madras zoo, Madras, Kodaikanal (1923, 1930, 1940)

Genus *Ophidascaris* Baylis, 1921.

O. sp.

Host. King cobra.

Location. Intestine.

Locality. Cochin State. Trichur zoo (1940)

Genus *Toxocara* Stiles, 1905.

T. canis (Werner, 1782)

Host. Dog, tiger.

Location. Intestine.

Locality. Madras zoo (1923)

T. mystax. (Zeder, 1800)

Host. Cat, tiger.

Location. Intestine.

Locality. Madras, Madras zoo, Bobbili, Coorç (1923)

Genus *Toxascaris* Leiper, 1907.

T. leonina (V. Linstow, 1902)

Host. Dog, tiger, lion.

Location. Intestine.

Locality. Madras, Nellore (Kavali), Kurnool, Madras zoo (1923)

T. transfuga (Rudolphi, 1819)

Host. Bear.

Location. Intestine.

Locality. Madras and Cochin zoos (1929)

Genus *contracaecum* Railliet and Henry, 1912.

C. sp.

Host. Kite.

Location. Intestine.

Locality. Madras (1932)

Family HETERAKIDAE Railliet and Henry, 1914.

Genus *Heterakis* Dujardin, 1845.

H. gallinae (Gmelin, 1790)

Host. Fowl.

Location. Caecum.

Locality. Madras (1923)

H. pusilla V. Linstow, 1906.

Host. Fowl.

Location. Intestine.

Locality. Madras (1938)

H. spumosa Schneider, 1866.

Host. Bandicoot.

Location. Intestine.

Locality. Madras (1929)

H. sp.

Host. Frog.

Location. Intestine.

Locality. Madras (1931)

Genus *Ascaridia* Dujardin, 1845.

A. galli (Schrank, 1788)

Host. Fowl, duck.

Location. Intestine.

Locality. Madras (1922)

Genus *Subulura* Molin, 1860.

S. sp.

Host. Squirrel

Location. Intestine

Locality. Madras (1930)

Family OXYURIDAE Cobbald, 1864.

Genus *Oxyuris* Rudolphi, 1803

O. equi (Schrank, 1788)

Host. Horse

Location. floating colon

Locality. Madras (1922)

Genus *Passalurus* Dujardin, 1845.

P. ambiguus (Rudolphi, 1819)

Host. Black rat

Location. Colon

Locality. Madras (1930)

Genus *Skrjabinema* Vereschagin, 1926.

S. ovis (Skrjabin, 1915)

Host. Goat

Location. Large intestine

Locality. Madras (1939)

Genus *Enterobius* Leach, in Baird, 1853

E. vermicularis (Linnaeus, 1758)

Host. Man

Location. Intestine (passed in faeces)

Locality. Madras. (1928)

Genus *Pharyngodon* Diesing, 1861

P. sp.

Host. Frog, house lizard

Location. Intestine

Locality. Madras (1931)

Family RHABDITIDAE Micoletzky, 1922.

Genus *Strongyloides* Grassi, 1879.

S. papillosus (Wedl, 1856) Ransom, 1911

Host. Calf, monkey.

Location. Intestine

Locality. Madras

Order STRONGYLOIDEA Weinland, 1858.

Family STRONGYLIDAE Baird, 1853.

Genus *Strongylus* Muller, 1780.

S. equinus Muller, 1780.

Host. Horse, mule.

Location. Caecum, colon.

Locality. Madras (1923)

S. edentatus (Looss, 1900)

Host. Horse, ass.

Location. Caecum, colon.

Locality. Madras (1923)

S. vulgaris (Looss, 1900)

Host. Horse, mule.

Location. Caecum, colon.

Locality. Madras (1923)

Genus *Decrusia* Lane, 1914.

D. additcta (Railliet, Henry and Bauche, 1914)

Host. Elephant.

Location. Intestine.

Locality. Madras zoo, Malabar (Manantody) (1923)

Genus *Equinurbia* Lane, 1914.

E. sipunculiformis (Baird, 1859)

Host. Elephant.

Location. Intestine.

Locality. Madras zoo (1923)

Genus *Choniangium* Railliet, Henry and Bauche, 1914.

C. epistomum Piana and Stazzi, 1900.

Host. Elephant

Location. Intestine.

Locality. Madras zoo (1923)

Genus *Oesophagodontus* Railliet and Henry, 1902.

O. robustus (Giles, 1892)

Host. Pony.

Location. Colon.

Locality. Madras (1939)

Genus *Triodontophorus* Looss, 1902.

T. serratus Looss, 1900.

Host. Horse.

Location. Colon.

Locality. Madras (1923)

T. brevicauda Boulenger, 1916.

Host. Horse.

Location. Colon.

Locality. Madras. (1937)

T. tenuicollis Boulenger, 1916.

Host. Pony.

Location. Intestine.

Locality. Madras (1937)

Genus *Trichonema* Cobbold, 1874.

T. longibursatum Yorke and Macfie, 1918.

Host. Horse.

Location. Caecum, colon.

Locality. Madras (1923)

T. calicatum Looss, 1900.

Host. Horse.

Location. Colon.
Locality. Madras (1937)

T. poculatum Looss, 1900.
Host. Pony.
Location. Caecum.
Locality. Madras.

T. bicornatum Looss, 1900.
Host. Horse.
Location. Colon.
Locality. Madras (1937)

T. nassatum Looss, 1900.
Host. Horse.
Location. Colon.
Locality. Madras (1937)

T. pseudo-carinatum Yorke and Macfie, 1919.
Host. Horse.
Location. Colon.
Locality. Madras (1937)

T. pateratum York and Macfie, 1919.
Host. Pony
Location. Caecum.
Locality. Hyderabad (1938)

T. radiatum Looss, 1900.
Host. Horse.
Location. Caecum, colon.
Locality. Madras.

T. tetracanthum Mehlis, 1831.
Host. Horse.
Location. Colon.
Locality. Madras (1937)

Genus *Poteriostomum* Quiel, 1919.

P. ratzii Kotlan, 1919.
Host. Horse.
Location. Caecum, colon.
Locality. Madras (1937)

P. imparidentatum Quiel, 1919.
Host. Pony.

Location. Colon.

Locality. Madras (1934)

Genus *Gyalocephalus* Looss, 1900.

G. capitatus Looss, 1900.

Host. Pony. mule.

Location. Caecum, colon.

Locality. Madras (1925)

Genus *Quilonia* Lane, 1914.

Q. renniei Railliet, Henry and Joyeux, 1913.

Host. Elephant.

Location. Intestine.

Locality. Madras zoo (1923)

Q. travancra Lane, 1914

Host. Elephant.

Location. Intestine

Locality. Madras zoo (1923)

Q. apiensis Geddoelst, 1916

Host. Elephant

Location. Intestine

Locality. Malabar (Manantody) (1942)

Genus *Murshidia* Lane, 1914

M. murshida Lane, 1914.

Host. Elephant

Location. Intestine

Locality. Madras zoo, Malabar (Manantody), Cochin State (Vadankanchery) (1923)

M. falcifera Cobbold, 1882

Host. Elephant

Location. Intestine

Locality. Madras zoo (1923)

M. indica Ware, 1924

Host. Elephant

Location. Intestine

Locality. Madras zoo (1923)

Genus *Bourgelatia* Railliet, Henry and Bauche, 1919

B. diducta Railliet, Henry and Bauche, 1919

Host. Pig

Location. Intestine

Locality. Madras. Nilgiris District. Ooty. (1932)

Genus *Amira* Lane, 1914

A. pileata Railliet, Henry and Bauche, 1914

Host. Elephant

Location. Intestine

Locality. Madras zoo (1923)

Genus *Oesophagostomum* Molin, 1861

O. dentatum Rudolphi, 1803

Host. Pig

Location. Intestine

Locality. Madras. Nilgiris District. Ooty (1931)

O. venulosum Rudolphi, 1809

Host. Sheep, Goat

Location. Intestine

Locality. Madras. Nellore. Venkataçiri. (1938)

O. columbianum Curtice, 1890

Host. Sheep.

Location. Intestine.

Locality. Madras (1923)

O. radiatum Rudolphi, 1803

Host. Cattle

Location. Intestine

Locality. Madras (1923)

O. brumpti. Railliet and Henry, 1905

Host. Monkey

Location. Intestine.

Locality. Madras zoo, Bombay (Haffkine Institute) (1923, 1937)

Genus *Ternidens* Railliet and Henry, 1909

T. diminutus Railliet and Henry, 1905

Host. Orangutanç

Location. Intestine

Locality. Madras zoo (1925)

Genus *Stephanurus* Diesing, 1839

S. dentatus Diesing, 1839

Host. Pig

Location. Kidney, liver

Locality. Madras slaughter-house, Malaya (1924)

Genus *Syngamus* V, Siebold, 1836

S. trachea (Montagu, 1811)

Host. Fowl

Location. Larynx, trachea

Locality. Madras. Malabar. Tellichery, Malay State. Butterworth (1931)

S. laryngeus Railliet, 1899

Host. Bull

Location. Larynx

Locality. Muktesar, U. P. (1925)

Family ANCYLOSTOMIDAE Looss, 1905

Genus *Ancylostoma* Dubini, 1843

A. duodenale Dubini, 1843

Host. Man

Location. Intestine

Locality. Madras

A. caninum Ercolani, 1859

Host. Dog, tiger, jackal

Location. Intestine.

Locality. Madras (1923)

A. braziliense Gomez de Faria, 1910

Host. Dog, cat.

Location. Intestine

Locality. Madras, (1923)

Genus *Galoncus* Railliet, 1918

G. perniciosus (V. Linstow, 1885)

Host. Cheetah

Location. In nodules of small intestine

Locality. Madras. Salem District. Hosur Cattle Farm

Genus *Agriostomum* Railliet, 1902

A. vryburgi Railliet, 1902

Host. Calf

Location. Intestine

Locality. Madras. Ooty. (1939)

Genus *Necator* Stiles, 1903

N. americanus Stiles, 1902

Host. Man

Location. Intestine (passed in faeces)

Locality. Madras (1928)

Genus *Gaigeria* Railliet and Henry, 1910

G. pachyscelis Railliet and Henry, 1910

Host. Goat

Location. Intestine

Locality. Madras. Nellore (1938)

Genus *Uncinaria* Frolich, 1789.

U. stenocephala (Railliet, 1884)

Host. Pig.

Location. Intestine.

Locality. Madras slaughter house, (1932)

Genus *Grammocephalus* Railliet and Henry, 1910.

G. varedatus, Lane, 1921.

Host. Elephant.

Location. Liver, bile ducts.

Locality. Madras zoo, Malabar. Manantody. (1923)

Genus *Bathmostomum* Railliet and Henry, 1909.

B. sangeri (Cobbold, 1879)

Host. Elephant.

Location. Intestine.

Locality. Madras zoo, (1923)

Genus *Arthrocephalus* Oortlepp, 1925.

A. gambiensis Oortlepp, 1925.

Host. Mongoose.

Location. Intestine.

Locality. Madras (1923)

Genus *Bunostomum* Railliet, 1902.

B. trigonocephalum (Rudolphi, 1808)

Host. Sheep.

Location. Intestine.

Locality. Madras (1923)

B. phlebotomum (Railliet, 1900)

Host. Cattle.

Location. Intestine.

Locality. Madras (1923)

Genus *Kalicephalus* Molin, 1861.

K. willeyi V. Linstow, 1904.

Host. Russel's viper.

Location. Intestine.

Locality. Madras. Salem District. Hosur Cattle Farm. (1945)

Family TRICHOSTRONGYLIDAE Leiper, 1912.

Genus *Trichostrongylus* Looss, 1905.*T. axei* (Cobbold, 1879)

Host. Cattle, sheep.

Location. Abomasum.

Locality. Madras (1939)

T. colubriformis (Giles, 1892)

Host. Goat.

Location. Abomasum, duodenum.

Locality. Madras (1938)

Genus *Haemonchus* Cobb, 1898.*H. contortus* (Rudolphi, 1803)

Host. Sheep.

Location. Abomasum.

Locality. Madras (1923)

Genus *Oswaldocruzia* Travassos, 1917.*O. sp.*

Host. Frog.

Location. Intestine.

Locality. Madras (1928)

Genus *Cooperia* Ransom, 1907.*C. pectinata* Ransom, 1907.

Host. Cattle.

Location. Abomasum.

Locality. Madras slaughter-house. (1939)

C. punctata (V. Linstow, 1907)

Host. Cattle

Location. Abomasum.

Locality. Madras slaughter-house. (1939)

C. sp.

Host. Deer.

Location. Duodenum.

Locality. Madras (1946)

Genus *Mecistocirrus* Railliet and Henry, 1912.*M. digitatus* (V. Linstow, 1906)

Host. Cow, deer.

Location. Abomasum.

Locality. Madras (1923)

Family METASTRONGYLIDAE Leiper, 1908.

Genus *Metastrongylus* Molin, 1861.

M. apri (Gmelin, 1790)

Host. Pig.

Location. Lung.

Locality. Madras. Ooty (1923)

Genus *Dictyocaulus* Railliet and Henry, 1907.

D. viviparus (Bloch, 1782)

Host. Cattle.

Location. Lung

Locality. Muktesar, U. P., (1925) Coorç (1935)

D. filaria (Rudolphi, 1809)

Host. Sheep.

Location. Lung.

Locality. Madras. Ooty, Muktesar, U. P. (1939)

D. arnfieldi Cobbold, 1884.

Host. Pony.

Location. Lung.

Locality. Madras (1947)

Order FILARIOIDEA Wienland, 1858

Family FILARIIDAE (Cobbold, 1864) Claus, 1885

Genus *Dirofilaria* Railliet and Henry, 1911

D. immitis (Leidy, 1856)

Host. Dog.

Location. Heart

Locality. Madras (1922)

Specimens in situ in the heart received from Malaya by courtesy of
Sri. A. R. Kuppuswamy in 1938

Genus *Dipetalonema* Diesing, 1861

D. dracunculoides Cobbold, 1870

Host. Dog, antelope

Location. Peritoneal cavity

Locality. Madras. Ramnad District. Rajapalayam (1935)
Forest Department (1926)

Genus *Onchocerca* Diesing, 1841

C. indica Sweet, 1915

Host. Cattle, buffalo

Location. Brisket

Locality. Madras. Kumbakonam (1923)

O. armillata Railliet and Henry, 1909

Host. Cattle, buffalo

Location. Aorta

Locality. F. M. S. (1925) Madras (1940)

Genus *Paraflaria* Yorke and Maplestone, 1926

P. bovicola Dejesus, 1934

Host. Cow

Location. Subcutaneous tissue

Locality. Madras. Guruzala, Srivilliputhur (1934)

Genus *Setaria* Viborð, 1795

S. equina (Abildgaard, 1789)

Host. Horse, mule

Location. Eye, peritoneal cavity, spinal column

Locality. Madras (1922)

S. cervi (Rudolphi, 1819)

Host. Bullock, horse, antelope

Location. Eye, peritoneal cavity, scrotum, cranial cavity, spinal column

Locality. Madras (1922)

Genus *Micipsella* Seurat, 1921

M. numidica (Seurat, 1917)

Host. Rabbit

Location. Liver

Locality. Madras. N. Arcot District. T. Malai (1932)

Family PHILOMETRIDAE Baylis and Daubney, 1926

Genus *Dracunculus* Reichard, 1759.

D. medinensis (Linnaeus, 1758)

Host. Dog, horse, man

Location. Subcutaneous tissue.

Locality. Madras (1923)

Family SPIRURIDAE Oerley, 1885

Genus *Habronema* Diesing, 1861

H. muscae Carter, 1861

Host. Horse

Location. Stomach

Locality. Madras (1923)

H. microstoma (Schneider, 1866)

Host. Horse

Location. Stomach

Locality. Madras (1923)

Genus *Draschia* Chitwood and Wehr, 1934

D. megastoma (Rudolphi, 1819)

Host. Horse

Location. Stomach

Locality. Madras. (1922)

Genus *Parabronema* Baylis, 1921

P. indicum Baylis, 1921

Host. Elephant

Location. Intestine

Locality. Madras zoo (1923)

Genus *Ascarops* V. Beneden, 1873

A. strongylina (Rudolphi, 1819)

Host. Pig

Location. Intestine

Locality. Madras slaughter house. (1932)

Genus *Streptopharagus* Blanc, 1912

S. sp.

Host. Monkey

Location. Intestine

Locality. Bombay (Haffkine Institute) (1937)

Genus *Physocephalus* Diesing, 1861

P. sexalatus (Molin 1860)

Host. Pig.

Location. Intestine

Locality. Madras slaughter-house (1932)

Genus *Spirocerca* Railliet and Henry, 1911

S. lupi (Rudolphi, 1809)

Host. Dog.

Location. Oesophagus, aorta

Locality. Madras, (1922)

Genus *Cylicospirura* Vevers, 1922

C. subaequalis (Molin, 1860)

Host. Tiger

Locality. Madras. Kurnool. Venkatagiri (1934)

Genus *Gongylonema* Molin, 1857

G. pulchrum Molin, 1857

Host. Buffalo

Location. Oesophagus

Locality. Madras slaughter house (1937)

G. verrucosum (Giles, 1892)

Host. Cow.

Location. Abomasum.

Locality. Madras (1923)

G. ingluvicola Ransom, 1904.

Host. Fowl.

Location. Crop.

Locality. Madras (1923)

G. orientale Yokozawa, 1925.

Host. White rat.

Location. Intestine.

Locality. Madras (1931)

Genus *Acuaria* Bremser, 1811.

A. hamulosa (Diesing, 1851)

Host. Fowl.

Location. Gizzard.

Locality. Madras. Salem District. Hosur Cattle Farm (1935)

A. spiralis Molin, 1858.

Host. Fowl.

Location. Proventriculus

Locality. Madras, Coimbatore (1931)

Genus *Echinuria* Soloviev, 1912.

E. sp.

Host. Fowl.

Location. Gizzard.

Locality. Madras. Malabar. Palghat (1926)

Genus *Tetrameres* Creplin, 1846.

T. spinosa Maplestone, 1931.

Host. Gallus domesticus

Locality. Madras (1942)

Genus *Physaloptera* Rudolphi, 1819.

P. praeputialis Von Linstow, 1889.

Host. Dog, cat, cheetah, bat.

Location. Stomach.
Locality. Madras. Kurnool (1923)

P. sp.
Host. Squirrel, kite, hawk, iguana.
Location. Stomach., intestine, peritoneal cavity.
Locality. Madras, Coorġ (1930)

Genus *Thelazia* Bosc, 1819.
T. rhodesii (Desmarest, 1828)
Host. Cattle, buffalo.
Location. Conjunctiva.
Locality. Madras (1923)

T. callipaeda Railliet and Henry, 1910.
Host. Dog.
Location. Conjunctiva.
Locality. Madras (1923)

T. sp.
Host. Fish.
Location. Muscle.
Locality. Coorġ (1938)

Genus *Oxyspirura* V. Drasche in Stossich, 1897.
O. mansonii (Cobbold, 1879)
Host. Fowl.
Location. Extra-ocular.
Locality. Madras, Malabar, Tellichery (1931)

Genus *Rictularia* Froelich, 1802.
R. mjobergi Baylis, 1928.
Host. Dog, cat, cat-bear.
Location. Intestine.
Locality. Madras (1929)

Genus *Spirura* Blanchard, 1849.
S. sp.
Host. Bandicoot, lizard.
Location. Stomach.
Locality. Madras (1929)

Genus *Metabronema* n.g. Yorke and Maplestone, 1926.
M. sp.
Host. Fish.
Locality. Coorġ. (1931)

Genus *Cyrnea* Seurat, 1914.

C. sp.

Host. Peacock.

Location. Intestine.

Locality. Nağpur, C. P., (1938)

Genus *Cosmocephalus* Molin, 1858.

C. sp.

Host. Kite.

Location. Gizzard

Locality. Madras (1938)

Family GNATHOSTOMIDAE Railliet, 1895

Genus *Gnathostoma* Owen, 1836

G. spinigerum Owen, 1836

Host. Dog, cat

Locality. Madras (1923)

Order TRICHINELLOIDEA Hall, 1916

Family TRICHURIDAE Railliet, 1915

Genus *Trichuris* Roederer, 1761

T. discolor (V. Linstow, 1906)

Host. Calf

Location. Caecum

Locality. Madras (1931)

T. ovis Abildgaard, 1795

Host. Cattle, sheep

Location. Intestine

Locality. Madras, Punjab (1923)

T. globulosa V. Linstow, 1901

Host. Camel

Location. Caecum

Locality. Madras zoo (1935)

T. giraffae (Dies, 1851)

Host. Giraffee

Location. Caecum.

Locality. Madras zoo (1925)

T. leporis (Froelich, 1789)

Host. Wild hare

Location. Intestine
Locality. Coorç (1931)

T. muris. (Schränk, 1788)
Host. Black rat
Location. Intestine
Locality. Madras (1928)

T. cameli Rudolphi, 1819
Host. Camel
Location. Intestine
Locality. Jodhpur State (1938)

(sent by the courtesy of the Animal Husbandry Expert of Jodhpur State)

T. trichiura (Linnaeus, 1771)
Host. Monkey
Location. Caecum
Locality. Madras. Coimbatore District. Erode zoo (1938)

T. alcocki Linstow, 1906
Host. Sheep, goat
Location. Intestine
Locality. Madras. Nellore District. Venkataçiri (1938)

Genus *Capillaria* Zeder, 1800.

C. annulata (Molin, 1858)
Host. Fowl
Location. Crop.
Locality. Madras. Salem District. Hosur Cattle Farm (1942)

C. bovis (Schnyder, 1906)
Host. Cattle
Locality. Madras

To be a first class general practitioner is, harder than to be a competent specialist

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SOME ASPECTS OF HAEMATOLOGICAL STUDIES DURING RINDERPEST IN GOATS.

BY

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Rinderpest in goats is by no means easy to diagnose. The characteristic symptoms of the disease as noticed in bovines are absent in goats. Beyond a rise in temperature and an occasional diarrhoea there are no other symptoms met with in these animals. Even on autopsy, the characteristic lesions are sometimes absent. Further, in natural outbreaks, the disease rarely spreads from goats to cattle and buffaloes (Bawa, 1939). So far the only relatively efficient method of diagnosis of Rinderpest is by passage through goats, observations of thermal reaction, post-mortem lesions and finally confirmation by cross immunity tests. And therefore a study of some aspects of haematological changes in the blood of goats affected with rinderpest was undertaken to find out whether the blood picture would be an aid to the diagnosis of the disease.

It is well known that leucocytes are considered to be the motile defences of the body against infection. Some infections stimulate leucocytic production, of one particular type or other; others may depress the production of all types of cell or of one type more than the other. Leucopenia has been described as a characteristic symptom in many virus diseases of domestic animals, e.g., Hoş Cholera—Dinwiddie (1914) confirmed by Lewis and Shope (1929) and Kernkamp (1939); Feline enteritis—Hammon and Enders (1929); Agranulocytosis of cat—Wayne (1947); Ferret Distemper, prior to visible clinical symptoms—Kirk and Collins (1945). It has been proved beyond doubt that the virus of rinderpest while circulating in the blood is contained in or closely attached to the white cells. Robey and Hale (1946) in a study of morphological changes in the blood of young cattle during rinderpest describe the occurrence of a sudden, pronounced and prolonged leucopenia beginning with a significant rise in body temperature. They further state that a distinct diaphasic fluctuation of the white cell count is noticed in each case, with an initial fall followed by an increase which finally ends in yet another drop in numbers. There is also a marked shift to the left in neutrophils, with the sudden decrease in numbers.

In the present work, young local-bred goats (1½-2 years) of both sexes employed in Rinderpest Goat Tissue Virus production at the Veterinary Research Station Lucknow, were used. The animals were purchased locally and their state of health was observed by taking daily morning and evening

temperatures. Any goat showing irregular temperature prior to inoculation of the virus was discarded. Determinations were made previous to the injection of virus and on subsequent days till the slaughter of the goat for supply of Goat Tissue Vaccine to the field. As the goats had to be slaughtered on the 5th day following the inoculation of the virus, the major part of the present data has its limitations up to 5th day. However, whenever possible, cases were observed either up to death or till complete recovery.

METHODS OF PROCEDURE

(a) *Obtaining Blood*:—Blood was obtained from the jugular veins, under aseptic precautions, by means of a 20-gauge needle and a 2 c.c. record syringe, using both veins alternately.

After drawing about 2 c.c. of blood from jugular vein, a few drops were transferred to two clean slides for differential count and the rest was used for erythrocyte counts and haemoglobin estimation.

Double Neubauer counting-chamber was used for erythrocyte and leucocyte counts. Haemoglobin estimations were carried out on Sahli-Adams pattern of haemoglobinometer.

The blood smears were stained with Leishman stain and ordinarily 100 leucocytes were classified as Neutrophiles, Lymphocytes, Monocytes, Eosinophiles and Basophiles. In case the total W.B.C. count was above 10,000 per c.mm. result was based on the classification of 200 or 300 cells.

(b) *Method of Recording*:—The figures have been recorded in absolute numbers. The 'Shiftograph' idea was adopted from Crocker and Valentine, which is the line used to follow various shifts to the left or right as based on Schilling Index—the number resulting from the division of non-segmented neutrophils by the segmented ones.

NORMAL HAEMATOLOGICAL VALUES IN GOAT

(Table showing comparative figures obtained by different workers)

No. Worker	Leucocytes Per c. mm.	Erythrocytes per c. mm. (Millions)	Haemoglobin Grams Per 100 ml.	Schilling Index
*1. Hayem	30,000	19.0	...	...
*2. Mohler & Washburn	9,200	9,976	...	...
*3. Storch	(12,057) (11,358) 8,000	14,567 10,150 16.0	...	...
*4. Warthin	...	18,000	...	...
*5. Malassez	...	9.0-10.0	...	...
*6. Sussford	...	12.7-14.2	...	...
7. Kolmer	5,000-14,000	9.0-19.0	4.5-8.5	0.03-0.11
8. Author	4,500-18,400	9.3-18.35		

* Note: The figures have been taken from S. H. Burnett.

Differential Count:

Leucocytes per c. mm.	Kolmer's figures	Author's Findings
Neutrophiles	2,100- 3,350	1,870- 8,670
Lymphocytes	2,100-11,250	2,115-12,144
Eosinophiles	1-100	55-2,310
Basophiles	0-600	0-276
Monocytes	50-600	0-810

DISCUSSION

From table I and II the occurrence of sudden, pronounced and prolonged leucopenia is evident. It begins with a significant rise in body temperature following the inoculation of Goat Tissue Virus in the experimental goats. In cases ending fatally the level of leucocytes never reaches normal while in surviving animals the level increases as the temperature falls. In one case the number reached above normal on the eleventh day but later it again fell to reach normal on about the fifteenth day. Analysis of the figures, however, revealed the increase due to rise in number of neutrophiles. This points to the probability of secondary infection at this stage. A study of the differential count shows that lymphopenia is the most constant feature in all the cases while neutropenia is not constant. Schilling's 'Shift to the left' is always present, but is never so marked as has been noticed by Robey and Hale (1946) among rinderpest infected young cattle. Eosinophiles gradually decrease following the rise in temperature and may totally disappear from the peripheral circulation till the subsidence of the reaction. They seem to be of great prognostic value as in favourable cases they appear again and reach the normal level when the temperature falls, while in fatal cases they totally disappear never to appear again.

Table III represents those cases which presented less pronounced leucopenia or leucocytosis. On postmortem examination all of them revealed conditions from slight congestion to areas of consolidation in the lungs. An analysis of the figures indicates increase in number of neutrophiles, the degree of increase directly corresponding to the severity of the lesion. On the other hand these complications have no influence on the lymphocytes and, therefore, lymphopenia still remains a prominent feature.

TABLE No. I

Case No.	Days	Temp. (°F)	Leuco-cytes.	Shiftograph	Differential Count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
1.	0	102.2	12,500		125	8,500	3,875			Recovered.
	1	101.8	13,100		-	11,480	2,500	-	-	
	2	101.8	13,100		-	9,432	3,669	-	-	
	3	102.0	10,500		105	2,460	4,935	-	-	
	4	102.4	8,700		-	4,947	1,833	-	-	
	5	105.4	8,500		-	7,221	1,079	-	-	
	6	105.4	8,500		-	4,176	1,566	-	58	
	7	104.6	8,600		172	6,880	1,368	-	-	
	8	105.0	8,600		68	5,455	3,256	-	-	
	9	103.4	10,600		105	7,770	2,625	-	-	
	10	101.4	13,500		135	10,125	3,400	-	-	
	11	102.6	19,900		597	15,303	3,963	-	-	
	12	102.4	17,100		171	12,254	4,275	-	-	
	13	100.8	14,200		142	10,082	3,976	-	-	
	14	102.4	15,300		532	7,641	3,187	-	-	
	15	101.0	13,700		180	240	6,040	3,600	-	
2.	0	101.2	20,500		-	208	8,944	11,648	-	Died on 5th morning.
	1	103.6	20,700		-	458	11,450	10,992	-	
	2	105.0	15,100		151	-	9,513	5,134	302	
	3	104.9	9,700		97	-	7,768	2,232	-	
	4	104.2	7,500		-	-	3,300	2,200	-	
3.	0	101.4	5,500		-	55	1,670	3,520	50	Died on 6th evening.
	1	101.4	4,700		-	55	1,728	1,245	-	
	2	105.2	5,500		-	-	2,652	1,245	-	

TABLE No. II

Case No.	Days	Temp. (°F)	Leuco-cytes.	Shiftograph	Differential Count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
1.	0	101.4	14,280		-	285	4,703	8,692	570	
	1	101.4	14,400		144	432	4,464	8,928	432	
	2	103.4	9,200		46	92	5,196	2,484	380	
	3	102.0	5,850		-	-	5,031	551	456	
	4	103.2	6,500		-	-	5,302	551	410	
	5	104.2	7,500		-	-	5,475	1,533	292	
2.	0	100.2	12,200		-	610	4,636	6,344	610	
	1	102.0	10,650		-	639	3,408	6,284	319	
	2	101.4	8,790		-	350	3,976	1,379	350	
	3	103.4	8,500		-	64	3,570	1,765	476	
	4	103.2	8,500		-	170	5,663	2,010	416	
	5	101.0	8,500		-	-	5,950	1,880	1,020	
3.	0	100.4	10,500		210	2,340	3,990	3,570	20	
	1	101.4	11,500		115	1,610	5,520	3,680	570	
	2	103.0	11,500		115	1,610	5,750	3,795	200	
	3	103.0	9,000		-	50	2,130	2,600	-	
	4	104.4	4,700		-	47	2,951	1,692	-	
	5	104.6	5,600		-	39	2,584	1,740	-	
4.	0	99.0	14,500		-	725	4,225	9,135	145	
	1	101.2	12,500		-	232	6,454	13,333	606	
	2	102.6	12,500		-	250	4,875	6,750	625	
	3	103.4	9,000		-	75	4,410	2,730	270	
	4	104.8	7,500		-	-	4,088	3,139	73	
	5	103.0	6,800		-	-	4,692	1,972	126	

Case No.	Days	Temp. (°F)	Leuco-cytes.	Shiftograph	Differential Count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
5.	0	100.6	16,000		160	960	5,120	9,440	320	
	1	101.2	16,000		342	1,035	5,301	10,059	342	
	2	101.2	16,500		-	808	7,755	7,755	165	
	3	106.2	5,400		-	405	3,456	1,728	168	
	4	106.6	6,400		-	64	3,584	2,624	128	
	5	104.2	5,700		-	-	2,109	1,592	-	
6.	0	101.6	13,800		275	562	6,210	6,624	138	
	1	104.8	14,000		-	625	4,500	6,880	-	
	2	101.6	10,500		-	405	6,660	6,660	-	
	3	104.4	7,500		-	75	5,175	2,175	75	
	4	102.2	7,800		-	-	5,694	2,028	78	
7.	0	100.6	11,500		-	605	5,405	5,290	-	
	1	103.4	11,800		-	1,062	7,080	3,656	-	
	2	104.2	7,000		-	490	4,340	2,170	-	
	3	104.4	66,900		-	-	4,968	1,932	-	
	4	105.0	65,500		-	-	4,350	1,450	-	
8.	0	101.6	13,800		136	1,342	6,210	5,796	552	
	1	101.6	13,700		-	178	6,840	3,195	276	
	2	103.4	8,500		-	-	6,319	2,195	-	
	3	104.0	8,700		-	87	7,047	1,566	-	
	4	104.4	6,800		-	272	5,202	1,020	156	

Table No. 17 (continued)

Case No.	Days	Temp. (°F)	Leuco-cytes.	Shiftograph	Differential count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
9.	0	102.8	22,500		-	228	9,244	17,328	-	Found pregnant at the time of post-mortem.
	1	101.5	25,500		-	265	9,485	21,360	-	
	2	101.4	9,500		-	43	4,687	3,870	-	
	3	103.3	10,000		-	77	6,830	3,100	-	
	4	105.2	7,400		-	177	2,849	-	-	
10.	0	101.6	14,800		-	568	6,600	7,252	-	
	1	101.4	13,200		-	608	8,902	7,600	-	
	2	103.2	7,800		-	920	6,370	5,100	-	
	3	104.4	8,000		-	360	4,600	4,400	-	
	4	104.4	8,000		-	40	6,520	1,440	-	
11.	0	103.2	15,900		-	318	4,482	11,130	-	
	1	103.0	13,700		-	88	5,460	5,112	-	
	2	103.2	11,000		-	320	6,410	5,060	-	
	3	106.0	4,900		-	40	2,410	2,352	-	
	4	105.6	4,600		-	-	3,052	1,518	-	
12.	0	102.0	9,000		30	450	5,310	3,060	90	
	1	101.5	8,300		53	747	4,648	2,822	-	
	2	102.4	4,800		-	240	3,024	1,938	-	
	3	104.0	5,000		-	-	4,959	741	-	
	4	104.4	6,100		-	-	5,620	560	-	

Case No.	Days	Temp. (°F)	Leuco-cytes.	Shiftograph	Differential count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
13.	0	101.2	11,900		-	357	7,415	3,505	119	Found pregnant at the time of post-mortem.
	1	101.5	10,400		-	445	5,524	4,027	104	
	2	102.6	5,600		-	236	3,192	2,072	-	
	3	104.8	6,200		-	-	5,208	922	-	
	4	103.6	7,100		-	-	5,364	1,736	-	
14.	0	101.8	13,800		-	220	5,580	4,800	810	
	1	100.4	22,300		-	125	6,270	6,000	-	
	2	103.2	9,300		-	-	6,555	2,945	-	
	3	105.2	5,100		-	-	4,990	2,530	-	
	4	104.6	6,800		-	-	5,675	1,125	-	
15.	0	102.6	22,300		-	221	13,260	8,619	-	Found pregnant at the time of post-mortem.
	1	102.0	27,300		-	-	20,475	6,922	273	
	2	101.8	13,900		-	414	8,694	4,692	-	
	3	104.8	12,400		-	124	8,929	3,948	-	
	4	102.8	8,600		-	228	6,108	2,236	-	
16.	0	102.5	18,100		-	174	5,328	1,740	57	
	1	102.8	19,800		191	1,267	8,326	8,597	-	
	2	102.6	18,800		-	955	6,303	11,651	-	
	3	106.0	7,300		-	1,224	7,888	4,468	-	
	4	104.4	10,300		-	290	4,056	3,199	156	

Case No.	Days	Temp. (°F)	Leuco-cytes.	Shiftograph	Differential count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
17.	0	101.8	19,300		-	191	8,326	9,493	-	
	1	102.6	20,000		-	200	11,200	7,800	200	
	2	103.4	19,700		-	-	12,008	7,092	-	
	3	104.0	16,400		-	-	9,676	6,724	-	
	4	106.4	5,500		-	-	3,770	2,030	-	
18.	0	101.0	14,500		145	438	4,060	9,715	140	
	1	101.0	12,300		-	615	4,797	6,888	-	
	2	101.0	12,200		-	610	3,782	7,665	-	
	3	101.6	12,400		-	484	6,929	6,697	-	
	4	103.8	9,400		-	94	4,794	4,512	-	
19.	0	101.6	14,400		-	288	4,608	9,504	-	
	3	104.6	4,800		-	280	2,944	1,462	-	
	4	105.0	5,200		-	124	3,848	1,352	-	

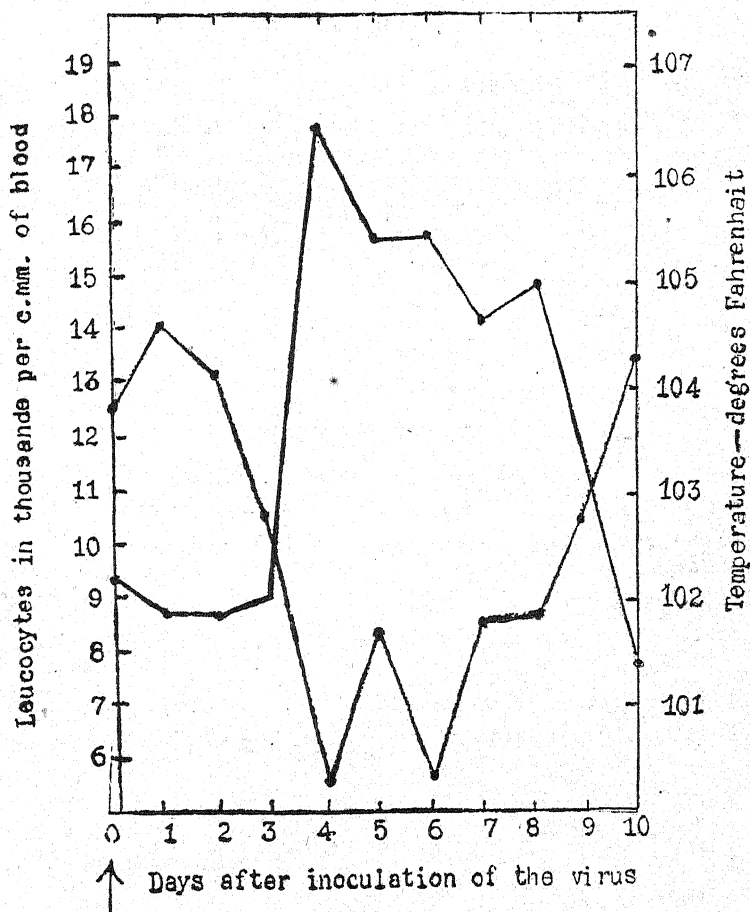
TABLE No. III

Case No.	Days	Temp. (°F)	Leuco- cytes.	Shiftograph	Differential count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
1.	0	102.0	4,500		90	225	1,590	5,110	160	Lungs found highly congested on post-mortem.
		102.2	4,000		-	80	1,300	5,000	-	
		104.0	5,500		-	150	2,400	1,920	50	
		104.3	5,500		102	104	2,632	2,540	50	
		106.2	4,500		-	45	4,300	1,136	-	
		106.4	5,500		-	212	3,869	1,219	-	
2.	0	101.4	19,250		220	1,540	4,428	13,050	190	Pregnant. Lungs found congested.
		102.4	22,500		-	2,250	9,020	10,824	220	
		103.8	13,400		-	1,200	5,494	6,700	-	
		104.4	14,400		-	1,130	7,056	7,164	1008	
		104.4	15,200		-	760	8,056	6,232	112	
		104.6	13,110		-	526	6,970	5,523	131	
3.	0	100.2	9,700		-	672	5,044	3,977	-	Lungs slightly congested.
		99.5	-		-	122	7,724	3,949	242	
		101.0	12,000		-	-	6,650	4,700	125	
		104.2	16,000		-	500	10,400	4,640	160	
		103.4	8,400		-	42	8,720	1,512	126	
		103.4	8,000		-	-	5,920	2,080	-	
4.	0	101.2	17,000		170	1,032	5,670	6,870	170	Lungs highly congested.
		101.8	18,300		-	122	4,580	7,748	376	
		101.6	11,400		-	333	7,689	2,442	555	
		104.6	10,400		-	308	7,696	1,976	520	
		103.6	15,500		-	-	14,985	1,015	310	
		104.8	17,800		-	89	15,041	2,799	-	

Case No.	Days	Temp. (°F)	Leuco- cytes.	Shiftograph	Differential count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
5.	0	101.0	14,500		-	1,015	2,300	10,440	145	Lungs highly congested.
		101.4	21,100		-	844	6,641	13,710	-	
		101.0	12,500		-	628	6,423	7,750	-	
		104.0	10,000		-	105	8,618	4,770	106	
		107.0	10,100		-	-	8,989	2,201	-	
		107.5	6,800		-	-	5,104	2,696	-	
6.	0	101.2	18,400		184	368	5,704	12,444	-	Lungs found highly congested.
		101.8	18,300		-	378	6,237	12,265	-	
		102.6	16,900		-	169	5,746	10,985	-	
		106.0	14,900		-	-	5,438	5,662	-	
		105.0	10,800		-	-	5,450	3,124	-	
		105.4	6,800		-	-	5,450	3,124	-	
7.	0	100.0	14,000		-	140	7,420	6,440	-	Died on 6th morning. Lungs found consolidated.
		99.0	14,800		-	296	6,956	7,956	-	
		103.6	12,700		-	381	9,017	8,920	-	
		101.4	14,700		-	-	12,690	1,269	141	
		101.4	14,700		-	-	12,690	1,269	141	
		101.4	14,700		-	-	12,690	1,269	141	
8.	0	99.5	10,300		-	545	2,725	7,630	-	Lungs found highly congested.
		99.2	12,400		-	500	5,000	7,000	-	
		100.0	6,700		-	249	4,316	3,852	85	
		103.2	9,300		-	-	7,357	1,913	-	
		106.0	8,800		-	-	7,040	1,760	-	
		103.4	11,400		-	-	10,266	1,416	148	

Case No.	Days	Temp. (°F)	Leuco- cytes.	Shiftograph	Differential count					Remarks
					Baso	Eosino	Poly	Lympho	Mono	
9.	0	101.8	17,000		-	510	9,800	6,650	-	Died on 5th day. Lungs found congested.
		102.6	19,000		510	360	10,450	7,600	-	
		101.8	16,000		-	900	6,400	7,600	-	
		104.6	13,200		-	1,128	6,072	5,940	-	
		105.0	14,000		-	140	10,920	2,940	-	
		104.0	16,000		-	-	13,200	1,800	-	
10.	0	101.2	24,600		-	984	13,284	10,332	-	Died on 5th day. Lungs found congested.
		101.4	24,300		-	466	16,036	7,776	-	
		101.6	19,600		-	354	13,056	6,958	192	
		104.0	16,900		158	316	10,568	4,740	-	
		104.0	16,900		-	-	11,550	2,950	-	
		106.2	10,200		188	376	12,220	6,016	-	

Baso = Basophiles per c.mm. of blood.
 Eosino = Eosinophiles per c.mm. of blood.
 Poly = Polymorph (Neutrophils) per c.mm. of blood.
 Lympho = Lymphocytes per c.mm. of blood.
 Mono = Large monocytes per c.mm. of blood.
 Leucocytes = Leucocytes per c.mm. of blood.
 Days = Days after inoculation of Goat Tissue Virus.

Leucocyte-temperature Relation During Rinderpest in a Goat

It has been noticed from observation on two cases that cases having pure and simple pulmonary inflammation without the infection of rinderpest present a very different blood picture. The blood picture in these cases is characterised by leucocytosis which is due to increase in number of neutrophils. There is no evidence of lymphopenia. A case of simple diarrhoea did not present any characteristic change in the number of leucocytes.

CONCLUSIONS

1. Uncomplicated rinderpest in goats is characterised by a marked leucopenia particularly due to decrease in number of lymphocytes, beginning

on the third or fourth day after the injection of the virus and persisting for about a week in those animals which survive or upto death in fatal cases. The decrease in white cells appears with the rise in body temperature and prior to the appearance of visible clinical symptoms. There also appears a 'Shift to the left' in neutrophils with the sudden decrease in numbers.

2. In cases with respiratory complications, neutrophils greatly increase in number, which may account for actual leucocytosis or less pronounced leucopenia. In these cases lymphopenia is always a constant feature.

3. Eosinophiles serve as a guide to prognosis. In favourable cases they soon reappear in the circulation while in fatal cases they remain completely absent.

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CONTROL OF ACUTE THEILERIASIS IN CALVES IN THE PUNJAB.*

BY

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In May 1940, we were called to attend a severe outbreak of acute theileriasis in calves of less than three months in age on a farm in the Multan district. On previous occasions the malady was recognised to have caused heavy death among calves on the farm. Locally the disease is known as *kanpher ki bimari*, i.e. illness with marked swelling of the parotid glands. It is produced by an endoglobular parasite, provisionally identified as *Theileria annulata*. The disease is prevalent from March to September, and the rate of mortality from 1936 to 1939 ranged between 13 and 23 per cent. Up to June 1940, the rate had reached 10 per cent. Since the chemotherapy of theileriasis has not yet been developed to a satisfactory stage, it is merely intended in this article to deal with the control measures adopted in endeavouring to eradicate the disease. A brief description of the symptoms as well as post-mortem lesions is given so that methods of diagnosis may be more widely known.

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SYMPTOMS

The disease occurs in acute and in subacute forms. In the former, the characteristic symptoms are dullness, discharge from the eyes and nose, raised body temperature (103°F to 106°F), marked swelling of the parotid, suprascapular and precrural lymphatic glands (figs. 2 and 3), frothy salivation, constipation followed by diarrhoea, ulcerated gums (as a result of which the calves cannot suckle) and a subsequent shrouding of the teeth (fig. 1). About the third week, most of the calves die and in the remainder symptoms become subacute. In some fatal cases, respiratory troubles, such as bronchitis and catarrh of the lungs have been observed. In the subacute form, the above symptoms are milder. Ailing calves continue to suckle. The body temperature usually remains below 104° F. Faeces are soft and yellowish in colour. Visible mucous membranes are pale and anaemic. The eyelids and the surrounding regions are oedematous. Such cases with proper care and nursing, are likely to recover after four weeks from the onset of the disease.

It may be mentioned that gingivitis and stomatitis are the most severe complications and render the animals unable to suckle. This results in loss of condition and progressive emaciation, leading finally to death. Another and less common complication is pneumonia.

LESIONS

The condition of the carcase is poor, mucous membranes are pale and in the majority of cases subcutaneous tissues, including fat, are stained deep yellow. The gums are red and ulcerated and show a light-grey gangrenous deposit. There may be pneumonia. The pericardial fat is deep yellow and the heart muscle pale. The liver is soft and icteric, petechiated and greatly enlarged (fig. 6). The gall bladder is usually distended and contains coagulated bile of dark-green colour. The spleen is soft and much enlarged. The urinary bladder often contains yellow coloured urine. The abomasum shows characteristic ulcerations (fig. 5). It may be emphasised here that prognosis is favourable only in cases where the mouth lesions are not severe.

CONTROL MEASURES

Sen and Sreenivasan (1937) tried several drugs for the treatment of experimental cases of theileriasis in hill bulls. Of these, atebirin (Bayer) was the only one which cured as many as 55 to 57 per cent of infected cases, but they also noted that natural recovery took place to about the same extent. Since so far no drug treatment has proved satisfactory for this disease, an attempt was made to control the arthropod vector, viz. *Hyalomma aegyptium*, with which the farm was found to be extensively infested. It has been proved to our satisfaction by one of us (H.N.R.) that



Fig. 1. Natural case. Extensive proliferation of gums and shrouding of the teeth.



Fig. 2. Enlarged precrural glands.



Fig. 3. Natural case. Enlarged supra-scapular gland.

(By the Courtesy of I. C. A. R.)



Fig. 6. Liver, enlarged and petechiated.



Fig. 4. A tick-proof paddock.



Fig. 5. Abomasum showing ulcerations.

N. B. Figs. 2, 5 and 6 are taken from a case in which the disease was transmitted hereditarily by the second generation adults of *Hyalomma aegyptium*, at the Imperial Veterinary Research Institute, I. ukteswar.

(By the Courtesy of I. C. A. R.)

this tick is responsible for transmitting acute theileriasis to young calves and that the infection is transmitted hereditarily only in the adult stage of the tick and not in the larval or nymphal stages. As found by Fotheringham and Lewis (1937), this is quite different from what has been experienced in *T. parva* infection.

The first object was to save the new-born calves. For this purpose, they were divided into two groups, viz., weaned at birth and unweaned. For the former, an area was rendered tick-proof by first digging up the earth to a depth of about 18 in. and then burning dry leaves and grass over the dug-up area. Subsequently, a moat about 9 in. wide and 6 in. deep surrounding the area was filled with water. Attendants were engaged exclusively for this tick-proof paddock. It was observed that calves, which were detained here for three months, were susceptible to infection when removed to an infected area, though none died. For the calves of the second group, more elaborate arrangements were made. Cows in advanced pregnancy were isolated from the main herd at a place about half-a-mile away. Before removing them to this segregation camp, all ticks on the animals were hand-picked, their tails and ears dipped in, and rest of the body sprayed every third day with an arsenical solution containing of soft soap 11 oz., liquid paraffin 1 lb. 2½ oz., sodium arsenite 1 lb. 1 oz. and water 50 gallons. Separate attendants and grazing pastures were arranged. There were also several calves which were weaned at birth, but were below two months in age. All these calves were dipped in the arsenical solution using a Cooper's portable swim-bath and housed in a paddock at some distance from the main farm. Dipping was done every third day as before. A few of these calves developed the disease, but at the first appearance of symptoms there were returned to the sick ward where they were given symptomatic treatment along with good nursing. The floor of the sick ward was covered with hay bedding about 4 to 6 in. thick, to afford comfort and at the same time to prevent them from licking the earth.

Control by vaccination.—In 1940, one of us (H.N.R.) observed that the introduction of the dead parasites rendered healthy animals immune to subsequent inoculation of virulent blood containing Koch's bodies. In the light of this observation, a vaccine was prepared by making a suspension in 5 per cent formalin of lymph glands and spleen from a heavily infected case on the farm. Soon after birth, calves were vaccinated subcutaneously with a 5 c. c. of this vaccine and kept in the tick-free paddock for 14 days before being transferred to the tick-infested area. Between May 23 and June 13, 1940, 19 calves (7 females and 12 males) were treated in this manner. Of these, 16 were transferred to the tick-infested area—the remaining three, being born of heavy milkers, were detained in the tick-free paddock. Some of the calves, 14-21 days after being liberated in the tick-infested

area, showed a rise of body temperature, but none of them died. As a control experiment, seven calves born from June 13 and July 7, 1940, were liberated into the tick-infested area within six to twenty five days of birth. Of these, four escaped infection and three died of acute theileriasis. In August 1940, seven calves were inoculated with a dose of 10 c. c. of the vaccine instead of 5 c. c. Five males from this batch were removed to tick-infested area, after the prescribed period, and none of these calves showed signs of the disease.

These observations on vaccination are suggestive and encouraging but, since no strict laboratory tests, such as the injection of vaccinated calves with virulent blood, have yet been made, we refrain from drawing conclusions from these few field tests.

In conclusion, we would like to stress the value of adopting tick control measures on farms where outbreaks of acute theileriasis are common amongst calves. The information so far obtained from this farm indicates that since the adoption of tick control measures, no further cases of theileriasis have been detected.

'Carrier' in theileriasis.—A number of cattle in this farm showed parasites in the peripheral circulation without exhibiting clinical symptoms. Two experiments were performed on the farm to test the infectivity of 'carrier' blood to young calves of susceptible age. The results were negative. These experiments prove that the endoglobular forms of the parasite, as met with in carrier blood, represents the gametocytes and as such undergo no further development in the vertebrate host. So that development may proceed to the sporogonic part of the life cycle they must enter an intermediate host—chiefly an arthropod. Evidently, however, carrier animals are potential sources of infection to clean *H. aegyptium*. These observations further stress the importance of tick control measures.

Summary

Methods adopted for the control of acute theileriasis in calves due to *Theileria annulata* are described.

Calves less than three months of age were the most susceptible, mortality rate amongst such calves between 1936 and 1939 ranging from 13 to 23 per cent. The vector of the disease is tick, *Hyalomma aegyptium*.

Control measures consisted in keeping calves weaned at birth in tick-proof paddocks for at least three months.

The liberal use of tick-dip was practised both for young calves and their mothers in order to keep down the number of ticks in the farm.

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D.D.T. AND ITS TICKICIDAL VALUE ON DOGS

BY

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D. D. T. (Dichloro-diphenyl. Trichlorethane) has been introduced in the market as a product of high insecticidal power. Eminent workers in Europe and America have tested it in the laboratory and the field for years and have reported favourably in the control of insect pests without ill effects on agriculture, human beings, poultry, fish and domestic animals. Burt (1945) has shown its effectiveness in killing ticks under laboratory conditions. Buxton (1945) says that it retains its toxicity for over fairly long periods. In view of these the possibility of its use as a practical acaricide on dogs and thereby reducing the chances of canine Piroplasmiasis and other tick borne diseases, a series of small scale trials were conducted at the Lucknow Research Station of the Animal Husbandry Department.

Historical.—The chemical—a white crystalline powder—was first synthesised in 1874 by Zeidler a German Chemist in Strasburg but it was only in 1939 that its remarkable insecticidal properties were discovered by Muller—a Research Scholar of the Swiss Dye Stuffs firm of Geigy of Basle. In 1941 Geigy firm informed its branch in United States of America about this new insecticide.

In 1942 the abbreviation—G. N. B. (Gesamol-Neocid-Base) was used for this active Principle and the Ministry of supply of Great Britain who had been informed earlier about its importance, devised the abbreviation D. D. T. for the compound in 1943. Before the discovery and introduction of D. D. T. Pyrethrum was the best insecticide and in 1942 when 70% of all pyrethrum was grown in countries under Japanese occupation, the allies fell short of insecticides. It was then that large scale production was ordered by various war departments.

During war D.D.T. was first used on a large scale in combating the vectors of typhus epidemic at the end of 1943. Subsequently D.D.T. found wider applications in fighting Vectors of Malaria—mosquito and its larvae. It was due to the large scale measures adopted by the allied armies in the recent World War II that millions of civilian and active servicemen were saved from disaster.

Material and methods.—Experimental subjects used in these trials were mongrel dogs about 2-3 years of age and heavily infested with ticks.

D. D. T. brands studied were

1. Neocid (10%) Geigy D. D. T. Powder
2. Atom Brand 10% D.D.T. powder
3. Alembic D.D.T., 5 % solution in kerosene oil
4. D. D. T. powder (probably practically pure. Kindly supplied by the officer-in-charge, hides and skin, Imperial Veterinary Research Institute).

The preparations of D.D.T. employed were classified as follows :—

1. *Emulsions.* These were prepared in kerosene oil using liquid soap solution as an emulsifying agent. Final D. D. T. concentrations tried were 0.3, 0.5, 1.0, 2.0, 3.0 and 4.0% for use as sprays as this method has largely superseded dipping.

2. *Ointment.* These were prepared with vaseline as base in final concentrations of 0.3, 0.5, 1.0, 2.0, 3.0 and 4% D.D.T.

3. *Powders.* Dusting powders were prepared with ordinary talc or starch in final D.D.T. concentrations of 0.3, 0.5, 1.0, 2.0 and 4 %. This method permits of very little risk of absorption.

4. *Oily dressings.* D. D. T. powders were mixed with sterile liquid paraffin (B.P.) to contain final D.D.T. concentration of 1.0, 2.0, 3.0, 4.0, 6.0 and 7.0%.

Experimental details.—Experimental dogs were examined for the degree of tick infestation and also for evidence of other diseases prior to application of the medicament. For a single concentration of each preparation dogs with as equal infestation as possible were grouped and generally one dog served as control. Tick infestation was marked and heavy on ears, groins, back, axillae in the order of sequence in all cases.

Emulsions were used in the form of sprays over the dogs with the common flit pump in quantities of 100-200 c.c. at about 10-12 lb. pressure, the dog being held by a masked attendant.

Application of the ointment was by rubbing thoroughly into the hair.

Oily dressings were applied by rubbing in 100-200 c.c. of the preparation.

Powders were dusted well into the scalp ; about 2 oz of the powder were used.

In all cases the subjects were controlled for about an hour to minimise waste of medicament, dilution and to allow a fair degree of contact with the parasites.

Observations were recorded at intervals of 6—10 minutes and $\frac{1}{2}$, 1 $\frac{1}{2}$, 2, 3, 21, 26, 43, 67, 93 and 141 hours after application for

1. Repellent effect and
2. Toxic effects as recorded by
 - (a) Dead ticks attached to the host
 - (b) Live ticks attached to the host
 - (c) Effect on the experimental subject
 - (d) Not liable to tick infestation
 - (e) Residual effect of the drug.

Effectiveness is gauged by the viability of ticks remaining on the host, the best criteria being death and disappearance. Facilities for intensive watch of individual ticks on and away from the dogs was limited for any length of time. Care was, however, taken that after the application of the preparation, for at least an hour, the patient did not come in contact with dust, dirt or rub off the dressing. At times only single dog had to be used for a single concentration as sufficient number of comparably infested dogs could not be procured.

Incidentally some ticks that got detached from the host-spray and powder group—were collected and watched in the laboratory. These showed excitement to begin with, later tremors, dorsal position—difficulty to assume the natural ventral position—inco-ordination of the distal limb and paralysis. Some flies present on the host died in about 10-15 minutes time and reinfestation was noticed after about seven days.

Results.—The action of the drug is slow and persists for about 2-2½ weeks. D.D.T. appears to be both a stomach and nerve poison characterised by a short period of excitement, tremors, dorsale position which is much pronounced, inco-ordination followed by progressive paralysis and death.

(a) *Emulsions.*—Emulsion sprays containing final D. D. T. concentration less than 2% did not give any promising results. Above this they were highly fatal to ticks in as much as the dogs were clean with 4% D. D. T. in about 3 hours. With these concentrations 1½—2 hours was the shortest period during which ticks were noticed to die and the dogs became clean in about 43 hours. Residual effect of 3% (Alembic brand) and 4% (M. brand) D. D. T. persisted upto 13 days. Accidentally 0.5% D. D. T. emulsion spray gained access to the eye of an attendant holding the dog. Except slight mechanical irritation for a day, no other untoward reaction was noticed till date of this paper.

(b) *Ointment* :—D. D. T. ointments less than 1% strong had no effect on dog ticks. At higher concentrations the ticks began dying at 3 hours and onwards and the degree of effectiveness was noted as under.

1 % Atom brand	dogs clean at	141 hours.
2 % " "	" " at	93 hours.
3 % Neocid brand	" " at	67 hours.
4 % "	" " at	43 hours.

Residual effect of 1 and 2 % continued up to 17 days whilst of 4% up to a 13 day period of observation with no fresh infestation though the surroundings were swarming with ticks. With an ointment it is possible the spiracles may be blocked and ticks may be asphyxiated and die.

(c) *Dry powder*:—0.3 and 0.5 % Atom brand powders were not of any tickicidal value. With 1 and 2 of the same brand the effect was marked in about 10-15 minutes as evidenced by the excitement and parading of ticks. In about 141 hours, with 1 % powder, the dogs were clean and the effect was seen to persist for 17 days. Results were much better with 2 % (Atom or Neocid) and 4 % Neocid brands as very few live ticks were seen attached after 21 hours. Residual effect of 4 % Neocid D. D. T. continued up to a 13 day period of observation.

(d) *Oily dressing* :—With less than 3 % (Neocid brand) D. D. T. only 20-25 % of ticks were got rid off in 43 hours. Concentrations over this gave the following observations.

3 %	— in 21 hours	mortality	50 % approximately
4 %	— in 43 "	"	100 "
4 %	— in 3 hours	"	80 "
	43 hours	"	100 "
6 %	— in 3 hours	"	90 "
	21 hours	"	100 "
7 %	practically same as 6 %		

The percentage computation made is the average records of three independant observers. The dogs remained clean, inspite of the infested surroundings for 13 days in case of 3 and 4% and 7 days in case of 6 and 7% when the experiments were concluded.

At the end of various trials the control dogs were still infested to about the same degree without any appreciable reduction in the number of ticks. Probably these were fresh infestations pointing to the receptiveness of the untreated hosts. Different concentrations of the preparations in single application tried did not prove toxic either to the dog or to the attendant.

Discussion :—From a perusal of the literature Soni (1946) suggests that 0.3 and 0.5 per cent D.D.T. emulsion is fatal to cattle ticks within a few minutes. Heath and Mitchell (1946) tried emulsions ranging from 0.1- 2.0% as anti-sheep tick dips but the results were so variable as not to allow formulation of specific recommendations. Gouck and Smith (1944) reported that a 5% emulsion as a wash or a 10% dust was effective in controlling brown dog tick and lone star tick infestations and even ten days after treatment the residue was a mass of dead ticks only. A dust containing 5 % of D.D.T. Neocid was found ineffective by Mathysse (1945) for control of sheep keds (*Melophagus ovinus*) as the mortality was only 7 %. As an acaricide in rats infested with ticks (*Notoedris muris*) D. D. T. in 1 % solution in liquid paraffin was comparatively ineffective (Taylor 1945) as compared with Benzene Hydrochlor (666). Buxton (1945) pointed out that D.D.T. has little effect on mite infestation and that ticks require high doses. Warren (1945) has reported the residual effect of D.D.T. on birds to be round about 2-3 weeks which is somewhat corroborated by these trials of ours and so far, the fact that ticks die within a few minutes with 0.3 to 0.5 % emulsions in kerosene oil and liquid soap solution could not be established. Surgent (1945) has pointed that application of 180 c.c. of the 5% D. D. T. solution gave good protection for 18 days during which time only one tick became attached in dog. Even the makers,

Geigy firm say the action of D.D.T. is slow and it may take insects from a few hours to 3 or 4 days, to die according to species and amount absorbed. The results should not be judged before a few days after application. For complete inhibition of egg laying in *Boophilus decoloratus*, Whitnell (1947) has suggested a 4% D. D. T. The action is slow and fairly persistent and the dogs became clean of live ticks in 43 hours with concentrations above 2 %. The ointment does not warrant sufficient effectiveness, for a longer time was needed, (67 hours) even with a 4% concentration. It is just possible that this partial in-effectiveness was due to dilution with earth and dust the animal got access to later. Thus ointmental preparations are not commended for general use due to the sticky nature, chances of dilution and the dogs not presenting a comfortable appearance to the aesthetic sense. 5% D.D.T. paste was successfully used against gulf coast tick and spinose ear tick with protection upto 3 weeks (Reedal and Smith 1944). Powders though clean and are easy of application are disadvantageous in that the animal could get rid off the dressing by a good shake. With this form the ticks got excited soon and began roaming about leaving the host. Oily dressings possess the disadvantages to some extent as those of ointments and are not favoured. Insects survive its (D.D.T.) effects for 24 hours or more (Frolicher 1944) before dying.

In spite of the fact that more experiments may still be necessary before definite conclusions could be formulated, yet there is evidence that D.D.T. is a safe insecticide in the strengths and frequencies we have employed and that emulsions as aqueous suspension used as sprays are the best method of application. A suitable effective application whose residual effect lasts upto 2 weeks is a 4% D. D. T. emulsion in kerosene oil and liquid soap solution. Low concentration of D.D.T. has no deleterious effect on the eye (Domeujoz quoted by Geigy firm).

Summary and conclusion.

(1) D.D.T. is definitely lethal to dog ticks in concentration over 1% and is a slow knock down and a sure kill. Of the products used, the aqueous suspension and dusts in the order named, if properly used, constitute the safe ones for use on dogs for cleanliness and efficiency.

2. Best concentration of D.D.T. is a 4% emulsion in kerosene oil and liquid soap solution.

3. The residual effect lasts upto 2 weeks.

4. D.D.T. is non-toxic to the patient and the worker in the strengths and frequencies we have studied.

SPRAY (KEROSENE OIL AND SOAP SOLUTION)

DDT product and its strength	No. of dogs	Tick infesta- tion	After 6-10 minutes	1 1/2 hours	3 Hours	21 Hours	26 Hrs	43 Hours	67 Hours	93 Hours, 141 Hrs.	Residual effect
A. 0.3%	2	heavy	Numerous	Numerous	Numerous	Numerous	Nu.	Numerous	Numerous, Numerous	Numerous	...
A. 0.5 "	2	"	"	"	"	"	"	"	72 hrs one died of diarrhoea pneumonia	120 hours died of pneumonia	...
A. 1.0 "	1	"	Tick falling still falling	A few dead & attached	Nearly 10% dead & attached	Nearly 80% alive & attached	as ab	as above	as above	as above 96 hours ran away	...
M. 1.0 "	1	"	Numerous Tick getting detached	As above	Tick falling easily attached	Nearly 60% alive & attached	as ab	50% alive & attached	as above	Used in another expt.	...
A. 2.0 "	1	"	Tick falling	As above	Few dead & attached	40% alive and attached	as ab	Died of pneumonia	...	...	...
M. 2.0 "	2	"	"	"	40% dead & attached	60% dead attached	as ab	80% absent & dead	as above	Used in another expt	...
A. 3.0 "	1	Moderate	Numerous	Plenty fell down	Plenty getting detached	80% absent & dead	5% alive	All dead	...	...	13 days
M. 4.0 "	2	"	"	Plenty getting detached	Plenty dead and attached	All died	All died	All died	All died	All died	13 days

A = Alembic; M = Mukteswar;

OINTMENT (VASELINE)

Atom Brand	No. of dogs used	Tick infestation	After 6-10 minutes	3-4 hours	1 1/2-2 Hours	3 hours	21 hours	26 hours	43 hours	67 hours	93 hours	141 hours	Residual effect
0.3 %	2	Heavy	Numerous	Numerous	Numerous	Nu.	Nu.	Nu.	Nu.	Nu.	Nu.	Nu.	...
0.5 "	2	"	"	"	"	"	"	"	"	"	"	"	...
1.0 "	2	"	"	"	"	Few dead & attached	80% alive & attached	as above	20% alive & attached	5% alive	A few alive	All died	17 days
M.1.0.,	1	"	"	"	"	Tick falling,	Still falling	About 5% absent.	80% alive & attach	as above	Used in another Ex	...	...
2.0 "	2	"	"	"	"	40% dead & attach	60 dead & attach	as above	5% alive & attach	A few alive	All dead	...	17 days
M.2.0.,	1	"	"	"	"	25% dead & attach	40% dead & attach	"	20% alive & attached as above	Used in another Ex	Used in another Ex	...	...
Neocid													
3.0 "	1	Moderate	"	"	"	40% dead & attach	60% dead & attach	"	5% alive	All died	All died	All died	dead
N.4.0.,	1	"	*	"	"	60% dead & attached	80% dead & attached	"	All died	"	"	"	13 days

POWDER (STARCH)

Atom.	No. of dogs used	Tick infes- tation	After 6-10 minutes	1 an hour	1½-2 hours	3 hours	21 hours	26 hours	43 hours	67 hours	93 hours	141 hours	Residual effect
0.3 %	2	Heavy	Numerous	Numerous	Numerous	Numerous	Numerous	Numerous	Numerous	Numerous	Numerous	Numerous	Numerous
0.5 "	2	"	"	"	"	"	"	20% fell down	60% alive & attached	20% alive & attach	Nearly absent	All absent	"
1.0 "	2	"	Ticks fell down	Ticks fell down	Plenty fell down	Plenty fell down	20% fell down	1 dog ran away	Nearly absent	1-2% alive & attached	dog died	...	17 days
2.0 "	2	"	"	"	"	20% absent	90% fell down	1 dog ran away	Nearly absent	1-2% alive & attached	dog died	...	...
N.2.0 "	1	"	"	"	"	40% fell down	Nearly all fell down	Nearly all fell down	A few alive & attached	A few alive & attached	Used in ano. expt	...	...
N.4.0 "	1	Moderate	"	"	"	80% fell down	Nearly abstain	A few alive	All fell down	All fell down	All fell down	All fell down	13 days

N=Neocid;

DRESSING (LIQ—PARAFFIN)

No. of dogs used	Tick infestation	After 6-10 minutes	1/2 an hour	1-2 hrs.	3 hours	21 hours	26 hours	43 hours	67 hours	93 hours	141 hours	Residual effect
1.0 %	1	Heavy	Numerous	Numerous	Tick falling	Tick falling	10% dead & attached	20% dead & attached	20% dead & attached	Used in another expt	..	..
2.0 "	1	"	"	"	"	"	Tick falling	Nearly 25% dead & absent	Nearly 25% dead & absent	"	..	..
3.0 "	1	"	"	"	"	Nearly 50 died	A few alive	All dead	All dead	All dead	All dead	13 days
4.0 "	1	"	"	"	80% dead & attach	A few alive	"	"	"	"	"	"
6.0 "	1	"	"	"	Nearly 90% dead	All Dead	All Dead	"	"	"	"	7 days
7.0 "	1	"	"	"	Nearly all dead	"	"	"	"	"	"	7 days

Acknowledgement :—We wish to place on record our deep gratitude to Sir Frank Ware, Messrs. T.J. Egan and T.S. Davies for their interest and guidance during the investigation. Our thanks are also due to the Health Officer, Lucknow Municipality. The Technical Assistance rendered by Mr. Ashad Hussain is gratefully acknowledged.

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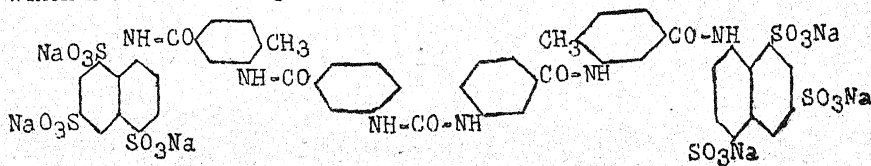
**SURAMIN IN VETERINARY PRACTICE—IDENTITY OF
 BAYER 205 WITH SURAMIN B.P.**

CONTRIBUTED BY

DR. J. M. MUNGRAVIN, M.B., B.Ch., M.R.C.S., L.R.C.P.

The discovery and development of the extremely important trypanocide, Bayer 205, was an achievement of outstanding importance and merit for which German workers were entitled to reap an appropriate reward. Nevertheless they were very reluctant to reveal the precise chemical structure of Bayer 205, and from the enquiries that are received from time to time it is evident that many users are still in doubt as to its precise composition.

Bayer 205 is a complex substance, the structure of which is not possible to prove by normal chemical and physical methods, and previously there has been no exact evidence of its structure. As a result of the synthesis and biological examination of a large number of complex ureas, the French Workers Fourneau, Trefouel, Trefouel and Vallee (*Comptes rendues*, 178, 675, and *Ann. Inst. Pasteur* 38, 81) concluded that Bayer 205 was almost certainly identical with their substance Fourneau No. 309, which has the following structure :—



In 1928, Bauer and Becker (Chem. Zentralblatt, 1922, I 2970) of the Georg-Speyer-Haus in Germany did reveal a constitution for Bayer 205, identical with that deduced by Fournau, but as the Germans never challenged the validity of the Poulenc Freres patent for the manufacture of Fournau 309, on the grounds of prior manufacture, doubt as to the constitution of Bayer 205 still remained.

Nevertheless, as Fournau's evidence appeared sufficiently conclusive, it was a compound of the structure of Fournau 309, which British workers set out to manufacture in 1934 and sell as "Antrypol", and which is now described in the British Pharmacopoeia as Suramin.

All doubts as to the complete identity of Bayer 205 (also marketed as Germanin and as Naganol) with Suramin B.P. have finally been dispelled by an examination of the actual German manufacturing process, which is precisely on the lines indicated in the British Pharmacopoeia monograph. The German manufacturing process was obtained during a B.I.O.S. Mission, and is deposited with the Foreign Documents Unit Library, Lansdowne House, Berkeley Square, W. I, with the file number F. D. 20/46, I-G Farben A. G. Elberfeld, Pharmaceuticals, process No. 59.

It can now be said quite definitely, therefore, that the following are identical—the German products Bayer 205, Germanin, and Naganol, the French Product Fournau 309, the British products "Antrypol" and Suramin B.P., and the American product "Naphuride Sodium".

"Taking the important subject of Animal Physiology as an example of the present position, I found that the major investigational work in this subject at Cornell is carried out in the College of Agriculture and not in the College of Veterinary Medicine, and until this position is reversed veterinary graduates, as a whole, will not be endowed with that outlook which would make it an axiom that they would be the first choice when investigational or development work of any kind connected with the domestic animals is contemplated. I once heard the late Sir Arnold Theiler at an important Conference propounded this maxim, which was received with the greatest approbation by all present, friend and foe alike, but I have sometimes thought that he might have added that it is up to the veterinary profession to see that, before making this demand, the curriculum at the teaching institutions is arranged so that there can be no question of the superiority of the veterinary graduate in all matters relating to the domestic animals. This, unfortunately, is not always the case at present."

Sir Frank Ware.

Veterinary Record, July 19, 1947.

THE INDIAN VETERINARY JOURNAL

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No. 2

Editorial

OUR FREEDOM.

"The Appointed Day has come—the Day appointed by Destiny—and India stands forth again after long slumber and struggle—awake, vital free and independent." "We are a free and sovereign people today and we have rid ourselves of the burden of the past. We look at the world with clear and friendly eyes and at the future with faith and confidence"

PANDIT JAWAHARLAL NEHRU.

At last the Deliverance has come. And India, dear old India, has become Free and Independent. The 15th of August 1947 will go down to posterity as the Day of Independence for our beloved Mother-land. By the Grace of the Almighty, this Independence has been attained in a way unparalleled in the history of the world: and, although credit must be given to the statesmanship of Great Britain in bowing to the inevitable with grace and dignity, the honours go to that purest and greatest living man of the world, a gift of India—Mahatma Gandhi—who with his band of selfless and noble followers conducted the fight for Independence not with arms and armaments, not with bombs and bombardments, nor again with crimes and cruelties but with that "matchless and unfailing weapon of Truth and Non-violence." To that greatest living

soul, to that band of brave patriots and stalwart sons of the land—we pay our homage in reverential regard, love and affection.

Thus ends the long period of British domination over India. In the midst of plenty, our people have been starving, owing to "the criminal neglect" of Agriculture and Livestock which has been, and, still, continues to be the main occupation of the vast millions of this country. To use the words of Mahatmaji, we have plenty of fertile land where we can grow fruits, vegetables and other foodstuffs. But we do not make full use of our opportunity..... God has given us everything we need and He has endowed us with intellect and the use of two hands. We can raise our food, grow cotton and prepare our own clothes, rear cattle and supply milk to our children. Yet we go hungry and naked. Our children are ill-fed and under-nourished. Could there be anything more tragic?" This tragic state of affairs must not be allowed to continue hereafter and a new chapter must henceforth open in the governance of the land. The duty of the Government from now on must be to correct these tragic conditions and our resolve for the future must be to this end. It is therefore heartening to hear Pandit Nehru, assuring us that our endeavour for the future should be to bring freedom and opportunity to the common man, to the peasants and workers of India. These people constitute the main strength of the country and they are to be found scattered in the neglected, in the criminally neglected 7 lakhs of Indian villages, eking out a miserable existence from the toil of the land. Unlike other countries, our country's economy is a cow-centred economy, and our downfall and degradation started from the day when that cow, the Mother of Prosperity, was ignored, ill-fed and ill-treated. To restore that cow to her traditional glory and power and economy, to rehabilitate the land and to assure us all with that precious freedom of all freedoms—freedom from want—these should be the prime concern of our Government. As Rajendra Prasad has said, in his broadcast on the Independence Day, "These (*i.e.*, Agriculture and the need to increase the milk supply in India) are so vital

to our existence." We have to think hard and labour hard if we are to increase our food production and improve our cattle and milk supply. In this, the Veterinary profession has got a vital part to play and we dedicate ourselves once again to this noble task with hope, faith and confidence in the gigantic work ahead of us. May God help us and guide us in this service to our revered Mother Land.

Animal Husbandry and Veterinary College,
Osmania University, Hyderabad Dn.

We are informed that the above Veterinary College started functioning from last year and that the syllabus of the course of studies is in accordance with the recommendations of the Veterinary Education Sub-Committee appointed sometime back by the Imperial Council of Agricultural Research. The teaching is done in Urdu, "which is the official language of the State". Naturally, the admissions are limited to the Urdu knowing candidates of the Osmania University who have Biology, Chemistry, Physics or Geology as their optional subjects. The course extends over four years and leads to the B.V.Sc., degree of the Osmania University. Mr. M. Habib Khan, M.R.C.V.S., F.Z.S. (Lond.), is the Principal of the College and we are sure that under his able guidance and stewardship, the institution will have a prosperous career and its *alumni* will go out into the world as shining lights of the Veterinary profession.

The imparting of higher Veterinary Education in the local languages in India is a new departure and is the first experiment of its kind in India. Its results will, therefore, be watched with great interest by everyone interested in the subject.

RETIREMENT

K. B. PILLAY, G.B.V.C., P.G.

(Contributed)

Mr. K. B. Pillay, Assistant, Director of Veterinary Services, in-charge Central Laboratory, Nagpur and Veterinary Investigation Officer, Central Provinces and Berar, Nagpur retired from service on the 6th January, 1947 after serving the province, for well over 33 years.

Born in the year 1890, in the Travancore State, Mr. Pillay graduated from the Bengal Veterinary College at the age of 24 and immediately took up service in the C.V.D., Central Provinces. An intelligent and capable Veterinary Assistant Surgeon, he was mostly kept in charge of the premier dispensaries in the province, such as Nagpur and Jubbulpore. After ten years service, he was promoted as a District Veterinary Inspector and later on to the rank of Assistant Director in Veterinary Service, Class II. He was the first person selected by the C.P. Government to undergo training in the advanced course of Animal Husbandry in 1941. On completion of the course, he was placed incharge of the Central Veterinary Laboratory, Nagpur and in 1943 was placed in additional charge of the duties of the Disease Investigation Officer. He fulfilled the responsibilities of these double duties with his hard and sincere work till the date of his retirement.

In the beginning of his service, Mr. Pillay got several better offers from other provinces, but he refused to accept them at the request of the then heads of the Veterinary Department. This evidently, goes to show the esteem he had gained from his superiors, even at the early career of his service.

By his retirement the department has lost a loyal, able and a sincere officer. He was liked by his superiors and was held in high esteem by his subordinates. He was very kind to

his subordinates and his pleasing manners and cheerful disposition will remain ever green in the memories of all those who came in contact with him. The outstanding feature in him was the philosophical ideals which he brought in practice even in his official capacity.

May God give him long life to enjoy his hard earned rest!

APPOINTMENT

Sri G. R. VISWANATHAN, G.M.V.C., P.G., (Edin.)

We congratulate Sri G. R. Viswanathan, G.M.V.C., P.G. (Edin.), Lecturer in Pathology and Bacteriology, Madras Veterinary College, on his appointment as Acting Principal of the same College. We feel glad that in appointing him as the Principal the Government have recognised the good work done by him in various capacities.

We wish him success in his work.

LATE Mr. A. J. MACDONALD.

(Officer I/C Poultry Research Section, Izatnaṣar).

(An Appreciation)

We regret to learn the sad demise of Mr. A. J. Macdonald under tragic circumstances.

Mr. Macdonald was a public servant of a very high order. His devotion to duty and his high sense of responsibility have rarely been excelled. Those who had seen him personally weighing hundreds of little chicks every day individually and noting their progress, in the midst of his even more responsible items of work, could not but admire his patience, industry and

adherence to truthful data. Work was the one all-absorbing passion with him. Unmindful of his dress and personality, he would be attending even to the minutest details of farm work. We wonder how many of his students have imbibed that spirit!

Who could ever forget his valuable contributions on poultry industry in Indian Farming, Poultry Gazette, etc? His lucid and racy style with no room for any doubt, marked him out as one of the best exponents of matters connected with poultry and poultry industry.

Mr. Macdonald had a rough exterior which made him sometimes to be misunderstood. But he was just the same either with an Indian or an European. He had no courtesy to 'Non-doers'. We only hope the high standard of work which he so assiduously built at Izatnagar, is kept up.

We draw this pen-picture of that great worker with a purpose in view. India needs such workers amongst her sons. Let us emulate the best wherever we find them. All talk and no work is not the way to retain the Freedom we have won. Let us be efficient in every field of work.

We have lost an esteemed colleague. But his spirit lives to those who care to emulate!

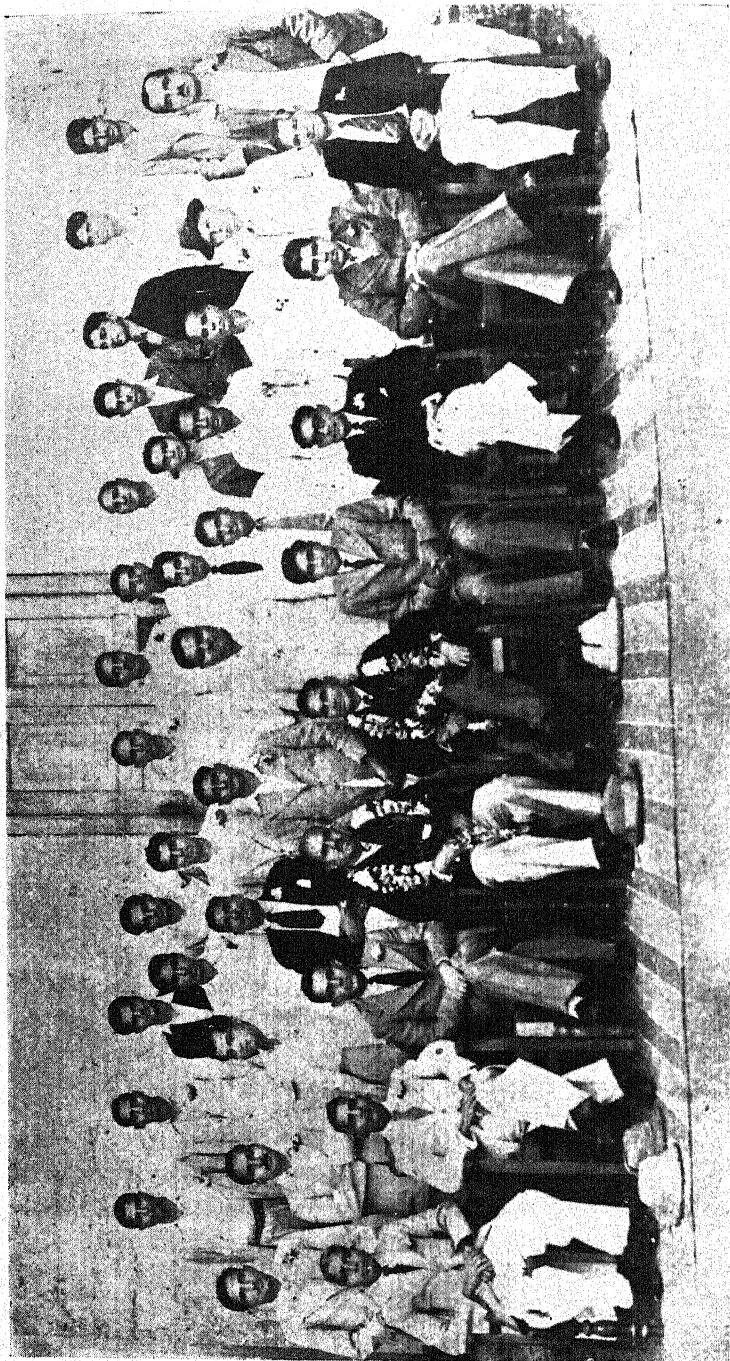
We offer our condolences to Mrs. Macdonald and the children. May his soul rest in peace!

T. V. M.



G. R. VISWANATHAN, G.M.V.C., P.G. (Edin.),
Who has been appointed as Ag. Principal,
Madras Veterinary College.

Group photo taken on the occasion of the Farewell Party to K. B. Pillay,
Retired Assistant Director of Veterinary Services, I/c Veterinary Laboratory, Nagpur,
by the Veterinary Staff of the Berar Division



Sitting:—Dr. G. J. Khond; Dr. E. S. Nair; Dr. E. Gopalan; Dr. P. S. Sundaram, A. D.; Dr. K. B. Pillay, Lieut. S. Ponnambalam;
Mr. S. P. Panikhar; Dr. G. R. Ramaswamy; Dr. A. Karim.
Standing:—Dr. B. A. Joshi; Dr. P. N. Puranik; Dr. V. D. Deshpande; Dr. K. N. Katiyar; Dr. K. V. Deshmukh; Dr. B. B. Rajput;
Dr. N. M. Deshpande; Dr. M. A. Kazak; Dr. D. Sheshao Rao; Dr. M. Ram Mohan Rao; Mr. D. P. Ketkar.
Standing:—Dr. Abdul Azeem; Dr. M. T. Kurkure; Dr. N. G. Kalkaonkar; Dr. P. R. Pathak; Dr. N. D. Bhawe; Dr. M. S. Gupta;
Dr. S. C. Ghosh; Dr. D. K. Damley; Dr. M. John; Dr. S. S. Venkatesan; Dr. S. A. Miyan; Dr. Y. T. Gadre; Dr. B.
R. Shindikar; Dr. Karandikar; Dr. Mutraji; Mr. Sheikh Channoo.

Clinical Articles

GESTATION PERIODS OF COWS—A CASE OF WIDE RANGE IN A DAIRY COW.

BY

FRANCIS JOSEPH, G.M.V.C., P.G. (Mad.),
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AND

P. V. NARASIMHAN, G.M.V.C.,
Asst. Lecturer.

AND

S. N. VAIDYANATHAN, G.M.V.C.,
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Fleming's Veterinary Obstetrics as revised by Craig (1930) contains on page 116 the following statement:—

"The average period of pregnancy in the cow is about nine months, or 39 to 40 weeks. In 1,062 observations the mean period was 283 days. Colin gives an average of 280 to 285 days. Dieterichs gives the shortest period as 210 days, the longest as 353 days, and the average as 286 days; while Baumeister and Rueff give the shortest as 240; the longest, 330 days; and the average, 285 days. The average of the Bernese Simmenthaler breeds at Hohenheim was 280 days; male calves, 283 days; and cow calves, 278 days. Earl Spencer after 760 observations, gives an average of 284 to 285 days. Gestation is usually longer for a male than a female calf, although in Earl Spencer's statistics the opposite held good. In the improved breeds generally the period is shortened".

Again on page 149 "Cases of abnormal retention of foetus have been observed in all domesticated animals, but most commonly in the cow. Saint-Cyr records 35 instances in the cow, 7 in the ewe, 5 in the mare and only one in the bitch. The length of time during which a foetus may be retained beyond the normal period varies from a few months to five years.

The causes assigned for this condition are those which prevent normal parturition..... The foetus may live for a certain time after the normal period provided the foetal membranes are not ruptured, and even increase in size. Cases of this kind have been noted up to 300 days in the cow, and in 2 cases 365 days. Most commonly the foetus dies at or near the time of first symptoms of parturition."

With these observations before us, we would like to record the following history of Cross-bred Cow No. 383 belonging to the Coimbatore Agricultural College Dairy. This cow was born on 14-10-34. It calved for the first time on 20-1-38 and, so far, has given birth to nine calves—one calf every year on an average. The first 8 calves—3 males and 5 heifers—were normal in every way, healthy and well, and these were born without difficulty. The ninth was a monster bull-calf which had to be extracted in a dead condition.

The period of gestation of the first eight calves (vide table) shows a wide range from 269 to 305 days, averaging 286 for the whole lot. The bull calves averaged 285 days, the heifer calves, 286.4 days. However, the longest and the shortest period of gestation have been in the bull calves only viz ; 305 and 269 days respectively.

The cow has held successfully to the first services in the case of the first seven calves, while the eighth calf appears to have been born to the second service, if we could exclude the longer gestation period calculated on the previous service.

The first 3 calves were sired by bull No. 73, the second 3 by bull No. 160, and the seventh calf by bull No. 61. Bull No. 102 was the sire for the eighth calf—2 services 25 days apart. For the ninth pregnancy, bull No. 238 was used.

This ninth pregnancy turned out to be an abnormal and interesting one. Firstly, the cow took the bull without any apparent ill effects while she was eight months advanced in calf. Secondly, the calf was carried long over-term. According to the service register, the period was 362 days and contributed a record approaching near to the period of 365 days mentioned in Fleming's Veterinary Obstetrics. Thirdly, dystokia was experienced by this animal for the first time in its life, in giving birth to the ninth calf. On the 362nd day of pregnancy, signs of parturition were noticed but the parturition did not proceed in the usual way. Trouble was suspected and examination revealed ruptured membranes, foetus dead, and unable to pass through the pelvis due to lateral deviation of the head with forelimbs folded at the knees. The fore-head showed the presence of teeth which abnormality suggested every possibility of a monstrosity within. This was a clear warning for careful manipulation in effecting the removal of the foetus. Correction of the deviation and delivery of the foetus by traction took about an hour mainly due to necessity of avoiding injury to the pelvic roof by the protruding teeth on the the fore-head of the monster.

After delivery, the cow was in need of attention for nearly 6 weeks when she was discharged cured. At the present moment she is in her tenth pregnancy, though she had to be served three times within five months.

On removal, the foetus was found over-sized and the writers believe that it must have continued to grow even after the average gestation period. The fact that there was still fluid within the membranes at the time of the manipulations suggests that the monster was living practically till the commencement of parturition and that the death must have been the result of dystokia.

Description of the Monster

On the middle of the monster's forehead, between the eyes, was a second lower jaw (the first two inches only) with the temporary incisors up. Above this was a freely moving piece of tongue-tip two inches long. This appendage was projecting out at an angle from the forehead rising to about an inch from the surrounding skin. This appears to be a simple monstrosity through excess in formation *Monocephalus dignatus* (incomplete).

Quoting Craig again (p : 289) on the frequency of monstrosities and their contribution to difficult parturition :

"Monstrosities are far from being rare in the domesticated animals, and among them are found most frequently in bovines.

Gurlt gives the following list of 740 monstrosities, showing the proportion in each species : cow 239, ewe 179, sow 87, bitch 78, cat 71, mare 56, goat 24, mule 3, ass 3. Saint-Cyr in 71 instances found 45 calves, 16 lambs and kids, 4 pigs, 4 kittens, 1 puppy, 1 foal. Baumeister and Rueff mention that in the King of Wurtemberg's private stud, of 2,340 foals produced, there were only 9 monstrosities. In the Hohenheim dairies, among the cows the monstrosities were only $1\frac{1}{2}$ per cent, and among sheep 1 in 768 lambs.

Though monstrosities are not rare in animals yet all do not give rise to difficult parturition : for in some instances the deformity does not interfere at all with birth ; in others, in which the deformity is of a such a nature as would impede delivery, birth often occurs prematurely when the foetus or foetuses are small and soft ; while even when fully developed double and triple monstrosities have occasionally been born without assistance."

The writers are of opinion that the large size of the foetus and the well developed abnormal head could have by themselves caused dystokia although actually there were other deviations to account for this.

TABLE

Cross-Bred Cow No. 383.

Born on 14-10-1934

Calving number	Date of service	Description of Sire	Number of services required for conception	Date of calving	Gestation period in days	Sex of calf
First	13-4-37	Scindhi Bull 73	(1)	20-1-38	292	Female
Second	8-4-38	73	(1)	2-1-39	269	Male
Third	20-4-39	73	(1)	2-2-40	288	Female
Fourth	12-5-40	160	(1)	13-3-41	305	Male
Fifth	15-5-41	160	(1)	20-2-42	281	Female
Sixth	26-4-42	160	(1)	6-2-43	282	Female
Seventh	19-4-43	61	(1)	25-1-44	281	Male
					322 (?)	
Eighth	8-4-44	102		16-2-45	289	Female
	3-5-44	102	(2)			
Ninth	5-5-45	238	(2)	3-5-46	362	Male
	23-1-46	238				(Monstrosity)

ACKNOWLEDGEMENT

The writers are indebted to Sri. R. N. K. Sundaram C.D.A., N. D. D., Senior Lecturer in Agriculture and Superintendent, Central Farm, Coimbatore, for making the College Dairy Records available to draw up the above table, without which the summary of observations made earlier would not have been possible.

CASTRATION OF A TIGER.

BY

CAPT. M.R. LAXMAN RAO, G.B.V.C., P.G., A.I.D.R.I.,
Veterinary Officer, i/c Palace Stables & Dairy, Gwalior, C.I.

A tiger belonging to the Animal Department, Gwalior State, was reported to be getting very ferocious and also going down in general condition. With a view to rendering it more docile, it was decided to castrate it.

On the 14th of May 1947, the animal was secured with strong ropes, the front and hind limbs tied separately and the head held slightly high (Fig. 1). The scrotum was cleaned thoroughly, the testicles were exposed one by one by scrotal incisions and removed by ligaturing the cords. The scrotal incisions were not sutured.



The subsequent treatment consisted in keeping the part clean and painting the area with Tr. Iodine. Healing was uneventful and was complete in about three weeks.

After the operation, there has been a definite change in the temperament of the animal. There was also improvement in its general condition.

Acknowledgement :—I am very much indebted to Lt.Col.H.K.Mehra, M.R.C.V.S., A.I.D.I., Director, Veterinary Department, and to Major Vasant Rao Ingle, Officer, Animal Department, for their help and keen interest rendered during this operation.

HAEMORRHAGIC SEPTICAEMIA.*

BY

D. F. G. SMITH, MAJOR, R.A.V.C.

The following clinical note on haemorrhagic septicaemia is recorded in view of what is believed to be a rare syndrome of this disease amongst buffaloes.

An outbreak occurred at the Military Farm, Nowshera (N.W.F.P.), in December 1940, on which at the time there were 200 buffaloes and 200 cross-bred and Friesian cattle.

The disease commenced amongst adult buffaloes housed in two adjoining sheds and later spread to the cows which were accommodated nearby. In all nine cases in buffaloes and three in cows occurred, all of which were fatal.

A particular point of interest was the curious predilection site of the swellings (usually located in this disease in the lymphatic glands of the throat). With the exception of two buffalo calves which died of acute septicaemia within twelve hours, the remaining seven adult buffalo cows all developed enormous swellings in the genitalia. Of the three buffalo cows, however, two developed the typical parotid submaxillary swellings with ensuing apoplexy and the other developed a hyperacute mastitis which was fatal in four days.

These notes are chiefly concerned with describing the peculiar effect upon the buffaloes affected with this disease. A few hours after the initial rise in temperature, a small swelling commenced at the lower fornix of the vulva (Fig. 1). It spread rapidly to the upper fornix and in as little as four hours assumed enormous dimensions (see Fig. 2). Death occurred (in all but one case) at periods varying between eight and seventy two hours after onset of the disease.

The genital swellings, with the exception of one case (Fig. 3) were tense and acutely painful. Erosion of the vaginal mucous membrane occurred and considerable quantities of a yellow serous exudate, containing numerous *Pasteurella* organisms, oozed from these swellings.

Towards the end of the outbreak which lasted nearly three months, the disease appeared to lose some of its initial virulence. Haemorrhagic septicaemia serum was administered to all animals on the farm within a week of the occurrence of the first case. The last case (Fig. 3) occurred in an adult buffalo which, incidentally, had received 25 c.c. of haemorrhagic

* Veterinary Record, No. 29, Vol. 59, August 2nd, 1947.



Fig. 1.



Fig. 2.



Fig. 3.

septicaemia serum 28 days previously. Death occurred six days later. The swellings in this case were pendulous and not very painful.

The outbreak was confirmed as haemorrhagic septicaemia by the Indian Military Veterinary Laboratory, Lahore, consequent upon examination made of various specimens including internal organs.

Records show that the incidence of this disease was above average on military farms in India during 1940-41. The syndrome of the disease described in this note, however occurred only at Nowshera.

TRYPANOSOMIASIS IN CIRCUS TIGERS.

BY

M. LAKSHMANA RAJU, G.M.V.C., P.G. (EDIN.),
District Veterinary Officer, Ellore.

AND

P. S. SWAMINATHAN, G.M.V.C.,
Veterinary Assistant Surgeon, Ellore.

It is well known that Trypanosomiasis is very common among equines and bovines in this Province. Its occurrence in two circus tigers is recorded in this report.

History.—The manager of a circus troupe which was camping at Ellore from 13-2-47 to 24-2-47 sought veterinary aid on the 13th February 1947 for the treatment of two sick tigers. The junior author (P.S.S.) paid a visit and found one Bengal tiger in a collapsing condition. The tiger was quite well on the 11th and was taken to the shows. On the 12th also it was found normal. Only on the 13th morning when the cage was brought to the tent from the railway station it was found sick. Blood smears were taken which on examination showed Trypanosomes resembling *T. evansi*.

Treatment.—The tiger weighed 200 lbs. 1.2 grammes of Antrypol dissolved in 10 c.c. Aqua distillata was given intravenously. But in about half an hour the animal died.

Blood smears of all the rest of animals in the troupe were examined. On the whole 48 samples of blood from 4 tigers, 1 cheetah, 3 lions, 3 bears, 17 horses, 6 goats, 8 dogs and 6 elephants were examined on 14-2-47. All were found negative for Trypanosomes excepting the one from a tigress aged one year and four months. This was confirmed by the Principal, Madras Veterinary College, who stated that organisms resembled *T. evansi*. This tigress had normal appetite, looked apparently normal and did its part in circus well. It weighed only 110 lbs. 0.6 grammes of Antrypol in 10 c.c. of normal saline was injected intravenously on 14-2-47. Once in every two days blood smears were examined and it was found that the Tryps disappeared from the blood from the very next day after injection. A second injection in dose of 0.3 grammes was given on 21-2-47. On 24-2-47 no organism was found in the blood smears, but the circus troupe left Ellore on 25-2-47 and therefore further examination of blood could not be made.

Technique of injection.—The tigress was cornered to one side of its own cage with the aid of two wooden planks put cross-wise inside the cage leaving little space for the animal to move about. A rope was put round its shoulders and held tight by two men outside the cage to restrict its movement further. One of the legs was drawn out through the iron bars and held tight by the trainer. The internal saphena vein was selected and injection was given with a 10 c.c. all glass syringe with an eccentric nozzle.

College News

BIHAR VETERINARY COLLEGE, PATNA

The following students are declared to have passed the Diploma Examination (Supplementary) held in the month of July, 1947 :—

(In order of merit)

- | | |
|-------------------------------|-------|
| 1. Dhirendra Narayan Jayeswal | Bihar |
| 2. Misbahun Nabi Zoberi | U. P. |
| 3. Tirbeni Singh Sharma | Bihar |
| 4. Satya Prasad Nautiyal | U. P. |
| 5. Ram Narain Chowdhary | Bihar |

S. K. SEN,

18th July, 1947.

Secretary, Board of Examiners,
Bihar Veterinary College, Patna.

ANIMAL HUSBANDRY AND VETERINARY COLLEGE, OSMANIA UNIVERSITY.

The following students have passed the first professional B. V. Sc.

Examination :—

- | | |
|----------------------------|--------------------------------|
| 1. Srinivas Rao Ade, | 9. Syed Kalimulla Kadri, |
| 2. D. S. Parmanand Rao, | 10. Seshachandra Deshmukh, |
| 3. M. Kishen Rao, | 11. Baburao Karalgiar, |
| 4. M. A. Razzack, | 12. Munawar Hussain Khan Kamal |
| 5. B. M. Deshmukh, | 13. Syed Abdul Sayeed |
| 6. Mohd. Jaffer Ali | 14. Kesheo Rao Deshpande |
| 7. D. Murli Manohar Swamy, | 15. Prabhakar Devalankar |
| 8. Mohd. Fariduddin, | 16. Syed Nusarat Ali, |

M. HABIB KHAN, M.R.C.V.S.,
F.Z.S. (Lond.),

Principal,

Hyderabad-Dn }
7th July, 1947 }

Correspondence

[The views expressed in letters addressed to the Editor represent the personal views of the writer and must not be taken as expressing the opinion or having received the approval of the A.I.V.A.]

Rinderpest and its Control in the Province of Bombay

The following Copies of Correspondence between Mr. Trisal and myself may be found interesting. R. N. Naik.

"Some time back, I read with interest, your article "Rinderpest and its Control in the Province of Bombay" in *Indian Veterinary Journal* Vol. XXIII pp. 203 to 216 (November 1946.) I would be grateful if you could very kindly let me have information on the following points :—

1. The keeping qualities of Goat blood virus, compared with those of Goat tissue virus,
 2. The quantity of blood that could be drawn from a goat—say one year old—without any risk of killing the goat thereby.
 3. The comparative severity of reaction in vaccinated cattle by Goat blood virus and Goat tissue virus
- Thanking for the trouble."

Reply 13th February 1947 from Mr. R. N. Naik Bacteriologist, Bombay Veterinary College to Mr. K. N. Trisal, Laboratory Officer, Veterinary Department, Kashmir State.

"I have received your kind letter dated the 19th instant with great pleasure. Replies to your questions are given here below :—

1. There is no difference in the keeping qualities of Goat virus contained either in blood or in Goat spleen tissue. For, blood is a tissue. Goat-adapted Rinderpest virus behaves alike both in blood and in spleen in respect of its viability when exposed to different degrees of temperature and light. But, in the aqueous suspension, the spleen tissue virus remains viable for about 12 hours at the room temperature and then loses its viability rapidly due to the destructive action of temperature, light and contamination.
2. Theoretically blood amounting to a maximum of 2 per cent of the body weight can be removed from a perfectly healthy goat

not subjected to long travels and malnutrition during the previous month.

3. The reaction produced by Goat blood virus and by Goat tissue virus is similar. For, the virus contained both in the blood and in the spleen tissue is the same and any dose which is equal to or more than the minimum infective dose behaves alike in the production of reaction when injected into animals susceptible to Rinderpest."

R. N. NAIK,

Bacteriologist, Bombay Veterinary College.

Cattle Shows.

We have received reports of the following Cattle Shows which we regret we are not able to publish *in extenso* owing to extreme scarcity of paper. These Cattle Shows as could be seen from the reports are getting extremely popular and we are sure they materially contribute to focus the attention of the public on the importance of the livestock in the rehabilitation of the country. We are very glad that the Veterinarians as the custodians of the livestock of the land, are taking a prominent part in the organisation and running of these Shows.

1. The 4th Chanda District Cattle Show held at Ahiri on the 15th and 16th February 1947.
2. The Chindwara District Cattle Show (Aboriginal) held at Delaheri on the 21st and 24th March 1947.
3. The Katol Tahsil Cattle Show held at Katol from 31st January to 2nd February 1947.
4. The Ongole and Regional Cattle Shows and Exhibition, Ongole, May 1947.
5. The Second Annual Toda Buffalo Show held in Wenlock Downs on the Nilgris on 7th December 1946.
6. The Fourth Buldana District Livestock Agricultural and Industrial Exhibition held at Khamgaon from the 21st to 23rd January 1947.
7. The Fifth Yeotmal District Livestock, Agricultural and Industrial Exhibition held at Yeotmal from 14th to 16th February 1947.

8. The Sixth Amraoti District Livestock, Agricultural and Industrial Exhibition held at Daryapur from 25th to 27th February 1947.
9. The First Livestock and agricultural Exhibition held at the aboriginal tract, Dharni, on the 22nd and 23rd March 1947.
10. The Fourth Akola District Cattle Show held at Mangrulpir on the 28th and 29th March 1947.
11. The Fifth Morsi Taluq Livestock Agricultural Show held at Salbardi on 19th and 20th February 1947.
12. West Godavary District Cattle Show held at Ellore on the 16th February 1947.

Abstracts

A Comparative Study of Rinderpest Bull-Goat Viruses, with a brief survey of the work done with Rinderpest Goat Virus in Madras.—By R. Krishnamurti, G.M.V.C.

A brief survey of the work done on the goat virus alone method of inoculation in the Madras Province is given.

Two strains of goat virus, the Mukteswar strain and the Madras strain, are maintained at the Serum Institute, Madras, and there is not much difference in the nature and percentage of reactions set up by them in the control calves.

It was found both from experiments conducted in the laboratory and in the field that the method of protecting cattle against rinderpest by the goat virus alone was not quite a safe one. The reactions set up by this method in the control calves were severe resulting in a mortality of 21.5 per cent amongst them. In the field, though the percentage of mortality was negligible, the severity of reactions set up by this method, especially in buffaloes, was such that it became unpopular amongst the ryots who could ill-afford to have some of their animals incapacitated for work and their milk yield reduced even for a short period.

The spleen tissue emulsion in normal saline solution also behaved in the same manner as the blood virus; hence it could not also be advocated for use without anti-serum.

From experience gained in this province it may be said that the ideal attenuation of the virus for use as such without anti-serum, in bovines, cannot be said to have been obtained by successive passages through goats.

The percentage of mortality among goat virus control calves was observed to be much less, less than even half of that which occurred among the calves used for the production of bull virus, though appreciable difference was not noticed in the degree and nature of other reactions.

Indian J. Vet. Sci. 15, 4.

Investigations on Famine Rations. Mango-seed kernel—By N. D. Kehar and R. Chanda.

Investigations have been made to find if mango seed kernel, hitherto rejected as waste, could be utilised as a feed for livestock.

Mango-seed kernel has been fed to bullocks with advantage to the extent of 50 per cent of the total digestible protein. The animals developed a liking for the kernels after a couple of weeks' feeding. During about 12 weeks' feeding adult animals gained, on an average, 33 lb in body weight and developed a fine condition.

Mango-seed kernel is a rich source of protein and carbohydrate. According to available figures, it is estimated that 70 million lb. of digestible protein and 760 million lb. of starch equivalent will be available per annum from this hitherto unrecognised source. The digestible protein obtained from 80 lb. of oats is equal to that obtained from 100 lb. and starch equivalent from 86 lb. of mango-seed kernel.

The high digestibility coefficient of the protein and nitrogenfree extract and the biological value of the protein give the seed a place in the list of important foodstuffs.

Work on the feeding of mango-seed kernel to rats is in progress.

Indian J. Vet. Sci. 15, 4.

Demodectic Mange of Goats in India.—By M. K. Sreenivasan, G.M.V.C., and S. W. H. Rizvi, G.B.V.C.

Demodectic mange of goats is recorded for the first time in India.

The mode of spread of the infection appears to be through long cohabitation.

Suckling kids in contact with diseased mothers have not been affected.

The infection has shown no special affinity for pregnant and long-haired goats as reported in foreign countries.

Experimental transmission was shown to be possible, infection occurring after an incubation period of 4-8 months.

Indian J. Vet. Sci. 15, 4.

Blood changes in cattle fed on a protein deficient diet—By Narain Das Kehar and V. V. S. Murty.

Observations on the morphological and chemical constituents of the blood of normal cattle and of those fed on a protein-deficient diet are presented. It has been found that the red cells, white cells, cell volume, sugar, haemoglobin, iron, total cholesterol, calcium, inorganic phosphorus, magnesium, non-protein nitrogen and the protein fractions are decreased in protein-deficient animals. As the globulins are especially associated with the integrity of the body cells, it may be that the decreased amounts of these immunologically active fractions in protein-deficient animals render them more susceptible to infection.

Indian J. Vet. Sci. 15, 3.

Preliminary studies on Calcium and Phosphorus in milk and feeds of Sahiwal cows.—By S. V. Desai and M. L. Mathur.

The percentage of calcium and phosphorus in the different milkings of a particular day in a cow showed no variation.

There was practically no variation in the percentages of calcium and phosphorus in the course of four weeks except in the premilkers or those cows which reached or passed the peak period.

When the cow was in the peak period the percentage of calcium and phosphorus in the milk decreased and when that period passed, the percentages of these elements in the milk increased.

When the yield was below 10 pounds, in the last days of lactation the percentage of Ca^{10} and $\text{P}^{2.5}$ increased.

In the premilk the percentage of phosphorus was very high and that of calcium very low, so much so that the ratio of $\text{Ca}^{10} : \text{P}^{2.5}$ attained a value as high as 1 : 3.64 in the beginning.

The percentage of calcium in the premilk gradually increased and continued to do so till a week or two after calving when the tendency towards stabilization appeared. On the other hand, the percentage of phosphorus increased for some time, reached the maximum before calving and then decreased. It continued to do so for a week or so after calving and then the tendency towards stabilization appeared.

The ratio of calcium to phosphorus was different in individual cows.

Indian J. Vet. Sci. 15, 3.

Association News

BOMBAY VETERINARY MEDICAL ASSOCIATION

The following three communications addressed by the President, Bombay Veterinary Medical Association, Bombay, one to the Secretary to the Government of Bombay, Agriculture and Rural Development Department, Secretariat, Bombay and the other two to The Hon'ble Minister for Agriculture, Veterinary and Forest, Secretariat, Bombay, are published for the information of the members.

From

D. S. LAUD, G.B.V.C., F.I.Z.S.,
*President, Bombay Veterinary Medical Association,
Parel, Bombay.*

To

The Secretary to the Government of Bombay,
*Agriculture and Rural Development Department,
Secretariat, Bombay.*

(1)

Subject :—Reorganization of the Veterinary Dept.

Sir,

With reference to Government Resolution, Reconstruction Department, 1038/III dated 2nd May 1947, I have the honour to state that my Committee learns with regret that the Veterinary Department is to be amalgamated with the Livestock Department and the separate Veterinary Department will cease to function. In this connection I beg to request you to kindly clear the following points :—The Resolution reads "the Agricultural Commissioner should be requested to submit proposals for the abolition of the Veterinary Department".

1. Whether the Veterinary Department is really to be abolished, if so, what will be its position in the new reconstruction plan.

2. Whether the Livestock is to be amalgamated to the Veterinary Department or whether Veterinary Department to the Livestock Department.
3. The present designation of the head of the Veterinary Department is changed to "Director of Animal Husbandry and Veterinary Science, Bombay Province". Does this mean that he is the Head of both the Departments or only of one and if not of both and if the Veterinary Department is to be abolished why the designation is changed.

In this connection I wish to bring to your notice that in other Provinces like the Punjab, U. P., and Madras Livestock Department is amalgamated with the Veterinary Department and the working has been quite satisfactory. In fact the Veterinary Department is the parent department, the members of which are the custodians of the health or otherwise of the cattle of any Province. If the Veterinary Department is expanded and maintained in perfect order and the livestock attached to it, the nation's wealth will be enhanced. It will be seen that Animal Husbandry, Dairy Development and such other sciences are entirely dependant on the sound health of the cattle. As such there will be no justification to either abolish the Veterinary Department or amalgamate it with the Livestock Department.

My Committee views with great awe and foresees danger in the proposed policy of either amalgamation or abolition of the Veterinary Department since it is not based on sound and scientific principles. From the Government Resolution it is seen that the Government desires not only to abolish the Veterinary Department or amalgamate it with the Livestock Department but to bring the proposed new Department and the new Head of the Department under the Agricultural Department (Reorganised) and the reasons given in the Government Resolution are self-condemning when the activities of the Agricultural Department are so unmanageable, there is no justification to make the Agricultural Department much more complicated by adding one more section and depriving the independent existence of the Veterinary Department. It will be very advantageous if the Livestock Department is amalgamated to the Veterinary Department and the New Department allowed to function quite independently without forming a part of the Agricultural Department, which is so much expanded that there is no justification for including the Veterinary Department under it, thereby unnecessarily depriving the Veterinary Department of an independent and proved efficient existence and complicating the working of the Agricultural Department and thus deriving ultimately no benefit for the Nation by such an arrangement.

In determining the policy regarding the Veterinary Department, has the Government consulted the Head of the Department and the Members of the Department at least some seniors who are well wishers of the Veterinary Profession in the Province, if this is not done may I request you to do the same before it is too late.

Your most obedient servant,

22nd July 1947.

D. S. LAUD,

President,

(2)

From

D. S. LAUD, G.B.V.C., F.I.Z.S.,
*President, Bombay Veterinary Medical Association,
C/O Bombay Veterinary College, Parel, Bombay*

To

**The Hon'ble Minister for Agriculture,
Veterinary and Forest, Bombay Government,
Secretariat, Fort, Bombay**

Subject :—Shifting of the Bombay Veterinary College to Poona.

Sir,

I have the honour to inform you that there is a strong persistent rumour that the Bombay Veterinary College will be shifted to Poona next year. If this be so, I beg to invite your urgent attention to the fact when a deputation of the Bombay Veterinary Medical Association waited upon you on the 15th November 1946, you were kind enough to give them an assurance that before taking a final decision in the matter you will visit the College and ask the Members of the deputation to be present at the time to discuss the matter on the spot. I understand that you visited the College lately but did not see your way to invite the Members of the deputation. So I respectfully remind you to fulfill your assurance before taking any final decision in the matter.

I have the honour to be

Sir,

Your most obedient Servant,

1st August 1947.

D. S. LAUD.

(3)

To

**The Hon'ble Minister for Agriculture,
Veterinary and Forest, Secretariat, Bombay**

**Subject :—Preferential treatment to war returned personnel
in the Veterinary Department.**

Sir,

I have the honour to invite reference to my letter Nos. 168 dated 24-12-1946 and 177 dated 8-3-47 and the two memorials submitted by the Veterinary Assistant Surgeons of the Civil Veterinary Department and state that the Government have not cared to respect the grievances of such an overwhelming majority and has been upholding the war-returned personnel of the department for appointments to higher posts without any justification. If this policy is continued any longer the already deteriorated morale of the department will take a grave turn. I would, therefore, request the Government to take up the matter immediately as it is already too late and remedy this grievance before it becomes irreparable.

Your most obedient servant,

D. S. LAUD,

President.

Bombay,
22nd July 1947.

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Extract.

IMPROVEMENT OF LIVESTOCK Madras Government Scheme

Madras, Aug. 20.

The Government have under consideration a scheme for the improvement of livestock in the villages, submitted by the Director of Veterinary Services. The scheme, which is expected to cost the Government an additional expenditure of about seven lakhs of rupees, aims at concentrating breeding bulls in suitable limited areas.

Under the scheme, a compact area consisting of a village or villages will be selected containing about 300 cows of breeding age. Four breeding bulls obtained from the Government Farm or an approved breeder will be stationed in the area and maintained by the Government. The breeding bulls and the breeding operations will be under the control of a stockman compounder who will be assisted by two attendants to look after the bulls. All the other male stock in the area will be castrated and only the services of these bulls will be made available to the cows. No fee will be charged for covering operations. The animals in the area will be protected against rinderpest and other cattle diseases. The cows and the progeny will be tattooed and the necessary records with regard to the breeding, pedigree etc., will be maintained by the stockman-compounder. Such of those male calves, which are considered suitable for stud purposes, will be purchased by the Government and issued to new centres. As the male stock are of primary importance the scheme proposes to give to the ryots, who own male calves, at the rate of Rs. 5 per calf per month, commencing from their seventh month, for a period of two years.

In the non-breeding tract areas, heifer calves are more important and it should be given greater attention. Therefore, it is suggested that owners of heifer calves be given Rs. 5 per mensem per calf for a period of two years commencing from the seventh month. This subsidy will be continued in the area until about the fourth or fifth generation when the subsidy to the female calves will be stopped and the male calves subsidised as in the breeding tract area.

The Veterinary Department have requested the Livestock Development Officer to suggest the breed of bull to be used in each district and the District Veterinary Officers have been asked to suggest the centre where the scheme should be introduced in their respective districts.

The scheme, it may be recalled, was discussed at a meeting of the Provincial Livestock Improvement Board, recently, when the general principles of the scheme were accepted.

Hindu
21-8-47.

Review.

Diagnostic Methods in Veterinary Medicine.—By Geo. F. BODDIE, B.Sc., (Edin.), M.R.C.V.S., F.R.S.E. Second Edition, 1947, *Published by Messrs. Oliver and Boyd, Ltd., Edinburgh. 15s. net.*

This book which was first published in 1944 has been revised and brought out as a second edition in 1946 and this in itself is a testimony to its merit.

The revised edition contains as many as twenty chapters with 3 appendices, an index and over 50 illustrations. The diagnostic methods have been considered under the various systems of the body like the Respiratory, Digestive, Nervous, etc while special chapters are found on clinical bacteriology, clinical helminthology, clinical haematology, allergic reactions and urine analysis. The chapter on Diagnosis of Poultry diseases, which is an addition in this edition is to be welcomed. A specially interesting feature of the book is that the consideration of the diagnostic methods is taken up after a short, preliminary survey of the Regional Anatomy—a feature which will commend itself to the student and practitioner alike.

We would like to offer our one or two suggestions for the next edition which we are sure will not be long in coming. The chapter on Genitalia and Mammariae is a very important one and it would be better if "the clinical and laboratory methods employed in the diagnosis of pregnancy in the larger domestic animals" are dealt with in greater detail and not left for "reference to standard works on the subject" Secondly, the radiographs in their original have got a value of their own and should be reproduced as they are. The drawings from them, however ably done in the book, cannot give us an accurate and correct picture of the lesions,

A prominent omission under the diseases of the nostrils is the Nasal Granuloma caused by *S. nasalis*—a very common disease of bovines in India.

On the whole, the book is ably and very well written and it should be in the hands of every student, teacher and practitioner.

The publishers have done their part well, considering that we have not yet got over the war time difficulties on newsprint and printing.

Obituary.

M. LAKSHMANA RAJU, G.M.V.C., P.G. (Edin.)

We regret to record the untimely demise of Mr. M. Lakshmana Raju, G.M.V.C., P.G. (Edin.), District Veterinary Officer, West Godavary, Ellore, on 27th July '47 at Ellore, leaving behind him his widow, two young children and a host of friends to bemoan his loss.

We offer our condolences to the members of the bereaved family.

B. B. JOSHI, G.B.V.C.

We deeply regret to announce the sad demise of Mr. B. B. Joshi, G.B.V.C. on 18th May 1947. The late Mr. Joshi was born at Birwadi (Kolaba District, Bombay Province), on the 3rd May 1886; passed his Matriculation examination in 1904, joined the Bombay Veterinary College as a Government scholar and graduated in the year 1907. He joined the Civil Veterinary Department soon after and was posted in charge of important dispensaries in the Province. In the year 1916 he was appointed as a Lecturer in Veterinary Science at the Agricultural College, Poona, where he served till his retirement in 1939. He was very popular among the students of the College and members of the teaching staff.

After retirement he was selected for the post of Director of Animal Husbandry by the Jodhpur State, where he served for about 3½ years. Due to ill health he retired and returned to Poona where he finally settled. He contributed many valuable clinical articles and compiled a manual on Animal Husbandry with special references to cattle breeding in 'Marwar' and the same is awaiting publication by the Durbar of Jodhpur State.

In him the Veterinarians have lost an able and everwilling guide. He leaves behind a widow, two sons, two daughters, many relatives and host of professional brothers to mourn his loss.

We offer our condolences to the members of the bereaved family.

(Ed. I.V.J.)

A. J. MacDONALD,

A Great Loss To The Poultry World.

A tragic event took place on the 23rd August 1947, in Cumberland (England) where Mr. A. J. MacDonald Poultry expert Izatnagar, was on a Holiday. Whilst bathing he accidentally got drowned. He was in perfect state of health and it is surmised that he should have got a cramp while in water. Mr. Mac Donald was specially recruited by the Government of India on a contract basis for five years in 1938 for the development of Poultry Industry in India. On expiry of the contract it was further renewed, but in 1946 he preferred to resign and take up a better job in United Kingdom. Mr. Mac Donald was a practical man and believed in practical work only. It was due to his untiring zeal and extremely capable direction that the laying, hatchability and mortality records of the Poultry Farm at Izatnagar compared so very favourably with those of some of the best Poultry institutions in the world. He achieved this within a short period of five years. As a field worker he was devoid of all show and false prestige. He was responsible for organising Military Poultry Schemes to which he supplied day old chicks in thousands for about two years by working day and night. The development of Poultry Industry in recent years in our country is not a little due to his remarkable powers of organisation. He organised Poultry Clubs, Poultry Shows, revived Poultry Gazette, supplied breeding stock, hatchable eggs, day old chicks far and near besides touring throughout the country for giving free advice to Poultry institutions and private concerns. As a student and subordinate of his for over five years, I pay this homage to him and convey my condolences to Mrs. Mac Donald and her small children. Surely the Poultry World has lost a giant in the field. May his soul rest in peace!

K. N. JOSHI,

*Experimental Cattle Breeding Farm,
107, Victoria Road, Jubbulpore, C. P.*

Our heartfelt condolences to the members of the bereaved family.

(Ed. I.V.J.)

We deeply regret to have to record the death of the following Veterinary Officers in F. M. S., and we give our heartfelt condolences to the members of the bereaved family.

Mr. A. R. KUPPUSWAMY, G.B.V.C., P.G. (Mad.)
Assistant Veterinary Officer, Penang, during the second half of 1944 after a short illness.

Mr. K. SITARAMAN, G.M.V.C., *Senior V. I. Raub*, F.M.S., in December 1944, leaving behind his brother Mr. K. Vaidyanathan, G.M.V.C. V.I., of Alor Gajah, F.M.S.

Lt. Col. W. ORR, the first Director of Veterinary Services, British Military Administration, Malaya, following a motor accident at Johore during the early part of December 1945.

M. N. K. KURUP, G.B.V.C. *Malacca Veterinary Department*.

DEVASAN, G.B.V.C. of *Johore Veterinary Services*, under tragic circumstances a staunch member of the I. N. A.

ERRATA.

Vol. XXIII, No. 5, (March 1947).

Page 384. Please read the heading of the article "*Bact. Alkaligenes*" instead of "*Bact. Algaligenes*." Page 384, para 2, line 2.—Please read "Gram negative" instead of "Gram positive."

Vol. XXIII, No. 6. pp. 466, paragraphs 1 and 2.

We regret that in the article entitled "Tape Worms in Canines—Therapeutic value of remedies used" by Mr. S. Ramanarayanan, G.M.V.C., the word 'Tabloid' was used in connection with the products of two manufacturers when the word "tablet" was intended. The word 'Tabloid' being the registered trade mark of Messrs. Burroughs Wellcome & Co., (The Wellcome Foundation, Ltd.), the use of this mark in connection with the products of two other firms was an unintentional inaccuracy.

Ed. I. V. J.



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General Articles

OXALIC ACID AS A GENERAL HEMOSTATIC*

BY

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The control of hemorrhage in surgery is of prime consideration. An operation which is practically bloodless is, without question, very impressive; indeed, it is preferable to one with much loss of blood. The value of an efficient hemostatic in hemorrhages due to accidents and in those accompanying certain diseases is too apparent to be stated.

The search for effective agents to control bleeding has, in recent years, actively engaged the attention of research workers. Many agents have been tried with this end in view. Just quite recently discovered is oxalic acid, which has been claimed to be a potent general hemostatic.

Steinberg (6), on December 6, 1938, read before the Medical Society of Roselle and Roselle Park, New Jersey, his preliminary observations on the relationship of the oxalic acid content of the blood and coagulation time. Milliken (4) in 1939 published a clinical report on the use of oxalic acid in the form of koagamin in transurethral prostatic resection with very encouraging indorsement of the drug.

Before the annual meeting of the American Physiological Society held in Toronto, Canada, on April 29, 1939, Steinberg and Brown (7) announced further experimental data on the use of oxalic acid in the control of bleeding. It has been reported that based on those observations, thousands of patients suffering from various types of hemorrhages were

*The data herein presented were gathered before the outbreak of the Greater East Asia War.

Read before the monthly Faculty Seminar of the College of Veterinary Science, University of the Philippines, March 17, 1944.

treated with very gratifying results. Later, Schumann (5), and Steinberg, Segal and Parris (8) reported additional supporting observations concerning the value of oxalic acid in hemostasis.

The extension to veterinary practice of the use of oxalic acid to shorten the blood coagulation time was first attempted by Miller and Davies (3), who conducted observations on 3 dogs and 1 mule. Later, Davies (1) used this drug in the treatment of internal hemorrhage in 6 dogs hit by cars; as preliminary to surgical removal of mammary tumors in 4 bitches; and in a dog requiring amputation of the right fore leg at the shoulder.

It is quite very apparent that, so far, studies on the use of oxalic acid as hemostatic in veterinary therapeutics have been made practically on dogs only and the data are rather very meagre.

The object of the present study is to contribute observations to the little veterinary information available on this matter.

MATERIALS AND METHODS

The observations herein presented were made on 20 apparently healthy native horses ranging from 2-1/2 to 9 years of age. Of these, 12 were males and 8 were females. In addition, 5 clinical cases—4 horses and 1 dog—were treated with oxalic acid solution to stop bleeding after surgical operations.

In determining the approximate clotting time of the blood, the drop method as suggested by Kolmer and Boerner (2) was used. The blood for examination was taken from a puncture of the posterior auricular vein, after the preliminary cleansing and disinfection of the part.

A sterile aqueous solution containing $\frac{3}{4}$ grain of chemically pure oxalic acid (Baker's Analyzed) per mil was used in this study. This was administered slowly and carefully per jugular vein in doses of from 30 to 40 cc, depending on the size of the animal, with only one dose given to each. The coagulation time of the blood of each animal was taken immediately before the administration of the solution, to have a basic working guide, then every 15 minutes up to 2 hours, then at 2-1/2, 3, 4 and 6 hours, after the injection. Once the post-injection clotting time had approximated or equalled that of the pre-injection, no further determination was made.

RESULTS AND DISCUSSION

The results obtained in this study are given in the accompanying Table. It will be seen here that the pre-injection coagulation time ranged from 8 to 14 minutes with an average of 10 minutes and 33 seconds (10-55 minutes). Fifteen minutes after the administration of oxalic acid solution per jugular vein, the clotting time of the blood suddenly dropped to less than 1 minute; it ranged from 24 to 59 seconds with an average of 40-25 seconds. Thereafter, the coagulation time progressively and continuously

rose up in 4 to 6 hours to the pre-treatment level, except in 3 cases. In these animals (Nos. 10, 14 and 19), the clotting time showed a drop again 1 hour after the injection, then continued to rise as the rest of the cases. This observation has a parallel in the 1 mule experimented on by Mille and Davies (3).

Considering the averages, the results of the present study may be graphically illustrated in the accompanying Chart.

The findings herein reported fully support the view that oxalic acid, in the doses used, is an efficient general hemostatic. It is indeed quite surprising that this drug, a local irritant, a corrosive poison frequently used for suicidal purposes, and long regarded as anticoagulant, can effectively shorten the blood coagulation time.

Among the animals studied, the writer failed to observe any ill effect. The observations on thousands of human subjects (4, 5, 7, 8) and on dogs (1, 3) indicate that the drug, in proper concentrations and administered through the proper channel, is practically harmless.

According to Davies (1), some sort of incompatibility probably occurs when this drug is used jointly with certain general anesthetics. He suggested that oxalic acid be used sparingly with general anesthetics until the precise reaction between them is definitely known, because he noted that in a few cases given nembutal and ether for general anesthesia, oxalic acid induced an alarming cyanosis. The patients, however, recovered uneventfully. While this undesirable reaction may not be produced with other general anesthetics, the writer believes that this suggestion is worthwhile remembering in doing surgery when oxalic acid is to be used in subjects to be placed under general anesthesia, to avoid possible embarrassment.

"The exact action of oxalic acid in the physiological process of blood clotting is still problematical, but it would seem that it acts as a catalyzer and adds to the function of calcium, platelets, and tissue juices in the formation of thrombin" (5).

Steinberg and Brown (7) and Steinberg, Segal and Parris (8) claimed that a correlative trend exists between the coagulation time and the oxalic acid level of the blood. They observed that a decrease in the clotting time is associated with a rise in the blood oxalic acid, whereas, in cases with tendency to prolonged bleeding, the oxalic acid level of the blood tended to be decreased. The latter investigators further observed that in cases treated with oxalic acid the increase in the oxalic acid of the blood was not due to the actual introduction of the drug, for the resultant oxalic acid level of the blood was greater than the original value plus the amount introduced. It has been suggested (5) that the introduction into the circulation of small amounts of oxalic acid steps up the formation of this substance already normally present in the body.

It has been the writer's observation that the blood clot on punctures formed under the influence of oxalic acid is peculiarly tough and tenacious and, therefore, quite different from the ordinary coagulum.

CLINICAL OBSERVATIONS

Oxalic acid was tried in the Clinic of the College of Veterinary Science, University of the Philippines, on 5 cases—4 horses and 1 dog.

The horses were just previously operated on for the removal of epizootic lymphangitis nodules in the breast and arm. There was continuous dripping of blood from the wounds even one hour after the operation. The use of artery forceps and other means proved futile. It was then decided to try oxalic acid on these cases. Two horses each received 30 cc., and the other two were given 40 cc. each of the oxalic acid solution. In all these cases, the hemorrhage was completely arrested two minutes after injection and never recurred.

The dog, just castrated by torsion, had bleeding for some time after the operation. Some attempts to stop it were of no avail. The injection intravenously of 5 cc. of oxalic acid solution checked the hemorrhage in less than three minutes.

SUMMARY AND CONCLUSIONS

1. Observations on the influence of oxalic acid as a general hemostatic in 20 apparently healthy native horses, and in 5 clinical cases—4 horses and 1 dog—are presented herein.

2. The clotting time of the blood of normal animals which ranged from 8 to 14 minutes with an average of 10.55 minutes (10 minutes and 33 seconds) before the injection of oxalic acid solution suddenly dropped to less than 1 minute—ranging from 24 to 59 seconds with an average of 40.25 seconds, fifteen minutes after the injection. Thereafter, the coagulation time increased progressively and continuously in 4 to 6 hours to the pre-injection level, except in 3 cases which showed again a drop 1 hour after the treatment.

3. The results obtained in this study further proved the efficacy of oxalic acid in hemostasis. Its successful use in 5 clinical cases herein reported demonstrated, even in a small measure, its practical value in veterinary therapeutics.

4. Oxalic acid, in amounts used in this study, proved to be harmless, as the writer failed to notice any ill effect among the animals observed.

ACKNOWLEDGMENT

The writer acknowledges his gratitude to Dr. A. K. Gomez, Dean of the College of Veterinary Science, University of the Philippines, for encouragement received during the progress of the work.

Table Showing the Influence of Oxalic Acid on the Clotting Time of Blood of Native Horses

Animal No.	Sex	Age (yrs.)	Pre-injection Coagulation Time (Min.)	Dose (cc.)	Coagulation Time at Various Periods After Injection of Oxalic Acid											
					15 Min.	30 Min.	45 Min.	1 Hr.	1 1/2 Hr.	2 Hr.	3 Hr.	4 Hr.	5 Hr.	6 Hr.	7 Hr.	8 Hr.
					Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.	Min.-Sec.
1	M	4	9	30	40	0-51	1-30	2-53	3-12	3-30	4-46	6-10	7-32	8-15	9-00	
2	M	3	13	30	30	0-48	2-00	3-10	4-01	5-00	6-10	7-03	8-10	9-00	10-00	
3	P	4	8	40	50	0-52	1-45	2-59	3-33	4-10	5-10	6-10	7-51	8-55	9-59	10-23
4	M	2 1/2	10 1/2	40	25	0-57	1-56	2-46	3-23	4-11	5-14	6-17	7-30	8-55	9-45	10-23
5	P	7	14	35	39	1-03	2-15	3-33	4-42	5-14	6-08	7-03	8-08	9-00	10-00	
6	P	8	9	35	35	0-53	2-04	3-00	4-11	5-08	6-10	7-03	8-08	9-00	10-00	
7	P	4	16 1/2	40	55	1-01	2-04	3-00	4-11	5-08	6-10	7-03	8-08	9-00	10-00	
8	P	2 1/2	18 1/2	30	24	0-57	2-16	3-11	4-06	5-17	6-23	7-21	8-15	9-00	10-00	
9	P	5 1/2	11	40	45	1-27	2-59	3-19	4-06	5-17	6-23	7-21	8-15	9-00	10-00	
10	M	7	12	40	50	1-03	2-42	3-19	4-06	5-17	6-23	7-21	8-15	9-00	10-00	
11	M	5 1/2	12	35	37	1-45	1-39	2-18	3-37	4-35	5-11	6-10	7-03	8-56	10-02	12-00
12	M	6	10	40	27	0-49	1-02	2-22	3-59	4-35	5-11	6-10	7-03	8-56	10-02	12-00
13	P	3	9	35	31	1-46	2-01	3-41	4-58	5-13	6-10	7-03	8-56	10-02	12-00	
14	M	8	14	40	40	0-48	1-27	2-17	3-17	4-11	5-14	6-17	7-21	8-25	9-30	10-00
15	M	9	14	40	40	0-48	1-27	2-17	3-17	4-11	5-14	6-17	7-21	8-25	9-30	10-00
16	M	6 1/2	8 1/2	35	48	0-58	1-05	2-00	3-00	4-03	5-08	6-10	7-03	8-56	10-02	12-00
17	P	5	9	40	40	1-20	2-09	3-00	4-03	5-08	6-10	7-03	8-56	10-02	12-00	
18	P	4	8 1/2	40	51	1-20	2-09	3-00	4-03	5-08	6-10	7-03	8-56	10-02	12-00	
19	E	5	10	35	35	0-58	2-00	3-00	4-03	5-08	6-10	7-03	8-56	10-02	12-00	
20	M	7	13	30	46	1-00	2-20	3-30	4-35	5-11	6-10	7-03	8-56	10-02	12-00	
Minimum			9	30	24	0-48	1-02	1-55	2-47	3-30	4-11	5-13	6-10	7-20	8-30	9-00
Maximum			4	40	59	1-46	2-59	4-00	5-33	6-17	7-21	8-25	9-30	10-43	12-00	13-00
AVERAGE			10.55	36.5	40.25	1-06.05	1-56.15	2-40.25	3-26.4	4-12.65	5-20.85	6-29.3	7-40.0	8-50.0	10-14.4	10-55.6

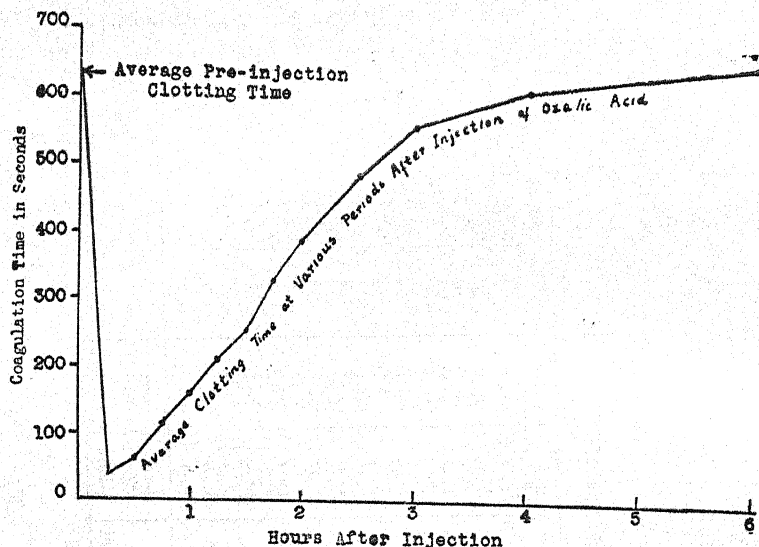


Chart Showing the Influence of Oxalic Acid on the
Coagulation Time of the Blood of Philippine
Native Horses

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RABBIT HUSBANDRY

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Rabbits are kept for pleasure, food and fur. They are also extensively utilised for experimental purposes. Rabbitry is a well developed science in some foreign countries, but as far as India is concerned, it is one of the many neglected industries. The purpose of this article is to throw light on the common problems of rabbitry of which the writer has got some experience.

Breeds of Rabbits:—There are many breeds and varieties of rabbits. There are fur, exhibition or fancy, and wool breeds. We need not go into their details; only the Angora and the Himalayan rabbits can be had in India.

The Angoras are pure white in colour and are common and very handsome. They produce wool 5" to 8" long within a year's time, and under commercial practice of shearing four times a year, the wool attains a length of 2" to 2½" each quarter.

The Himalayan is a pretty variety with short fine fur and red eyes. The ears are very short and firm. This variety is very hardy and prolific.

The common rabbits which may be of any colour is of mixed inheritance. Most of the rabbits found in India belong to this variety.

Housing of Rabbits:—The two systems of housing rabbits are well known.

The warren or colony system in which a number of bucks and does are kept together and allowed to breed indiscriminately, is not much recommended. In this system at least 6" of cut straw or hay or pine leaves should be spread on the floor. The pucca floor is preferred to prevent burrowing. This system was tried here in the previous years and was ultimately given up, as the results were very disappointing.

The hutch system in which separate hutches are provided for each doe and buck, has much in its favour. Hutches are usually made of wood in the shape of boxes 4½' square and 1½' high are the ideal dimensions of a hutch. The details for making a hutch can be had from any good book on rabbitry.

The bottom of the hutch should be either of perforated metal or wire netting to allow the faeces and urine to pass directly into a tray kept below

and this metal floor will also facilitate disinfection. The wooden floor is highly objectionable as not only it interferes with disinfection but it soaks urine and faeces and makes it almost impossible to get the rabbit house rid of the peculiar foul smell.

The hutch must be divided into two compartments. The $\frac{1}{3}$ portion at one end must be enclosed with wooden board, to provide privacy to the doe during kindling period as she cannot bear to be watched while making her nest and caring for her young. The remaining $\frac{2}{3}$ must be enclosed with such a wire netting as to effectually prevent rats and snakes. It has been observed here that if rats are allowed to get in, they destroy the young rabbits and damage the large ones a great deal.

Bucks should be kept in separate hutches in a separate compartment of the rabbit house to prevent them from fighting and injuring each other.

Feeding :—For successful breeding of rabbits, their proper feeding on a balanced diet is very essential. Feeds should include two or more grains, a plant protein supplement, greens or root crops and salt.

Crushed gram and wheat or wheat bran supplemented by pea-sized linseed or sesame cake steeped in water for a few hours is palatable and desirable.

The following mixture given at the Indian Veterinary Research Institute, Mukteshwar, has been tried here at this depot and found very satisfactory.

Crushed gram	...	30 parts.
Wheat bran	...	50 parts.
Crushed maize	...	20 parts.
Salt	...	1.5 parts.

For the last few months due to non-availability of maize we have been feeding only gram and wheat bran and our rabbits are doing well. The gram can also be substituted by the linseed cake.

The amount of feed varies with the age, size and other circumstances. Generally two ounces of the mixture per head daily with four to six ounces of greens is sufficient for the well being of the animal. The pregnant does and does with litters should be allowed 50% more food. The food should be divided into two parts, $\frac{1}{3}$ to be fed in the morning between 8 and 9 A.M. and the rest $\frac{2}{3}$ at 5 P.M. which should be allowed to remain in the hutches as rabbits eat more at night.

Greens :—Immature and actively growing crops are natural food of rabbits. Lawn clippings, cabbage, waste from garden vegetables, Lucerne, fresh dub, sweet potato vines are palatable. High humidity specially at a

place like ours where rainfall is very high, is the most important vital factor causing indisposition amongst rabbits. Any green stuff for rabbits should be devoid of any extraneous moisture and on no account should be wetted to keep it fresh. The greens lying on the floor of the hutch and contaminated with faeces are often the cause of trouble. The greens should be placed on a wire rack attached to the front of the hutch within the reach of rabbits.

Water:—Plenty of fresh pure water should be supplied to rabbits. In summer they require large quantities 3 or 4 times a day. At low temperatures, as at this place, the rabbits should be offered water atleast once a day just previous to feeding.

Feeding vessels:—Metal troughs or cups affixed to the front of the hutches with hooks both for grains and water are essential. It is better to clean and boil these vessels daily to avoid the risk of spreading any infection.

Cleanliness:—General rules of hygiene should be observed as the least slackness on this score will cause disease. Does about to kindle and with young litters should be disturbed as little as possible and such hutches if cleared out every 3 days will be sufficient. * The other hutches should be cleaned daily, dried, disinfected with a blow lamp specially during the rainy season. This will help to keep in check the coccidiosis, the most dreaded problem of the rabbitry.

Breeding:—In-breeding and line-breeding are the same in principle and should not be attempted as, besides intensifying readily the poor qualities they will lead to a variety of progeny, owing to the mixed ancestry of the rabbits. Cross breeding of pure breeds may be attempted. For pure breeding, the different breeds must be kept separate and the best females should be mated with the best males of the breeds.

The breeding age of rabbits is six months to 3 years. The average gestation period is 30 days. It varies from 29 to 31 days. For success one should follow a definite breeding schedule. One must not aim more than 3 litters in a year. A litter usually consists of 4 to 6 young ones. A card showing the date of mating, kindling and weaning must be fixed to each hutch.

The signs of heat are restlessness, nervousness, efforts to join other rabbits in nearby hutches, rubbing the chin on the feed receptacles and stamping on the floor. This condition continues for some time, but does not reoccur regularly and may be missed.

Mating:—One buck is usually allotted 6 to 12 does to serve. Mature vigorous buck may be used 2 times a week.

The popular and more scientific method as practised in the foreign countries, is to take a doe in heat to a buck's hutch for service, because the doe is likely to object to another rabbit being placed in her hutch and may attack and injure the buck. Usually mating occurs immediately indicated by mounting and falling over of the buck on one side. One fall is generally sufficient. After the mating being accomplished, the doe should be returned to her own hutch. This system requires personal supervision of mating.

The other method of mating which is being followed here with success is to place the buck in the doe's hutch and to allow to remain with her for 3 days.

Season :—The highest percentage of conception upto 90% has been recorded here during the months of February, March and April. July and August are the most unfavourable months for mating and some times the rate of conception have gone down even below five per cent.

Factors that limit conception :—

- (a) False pregnancy,
- (b) Sterility,
- (c) Extreme ages,
- (d) Poor condition,
- (e) Faulty mating,
- (f) Inadequate supply of greens.

False pregnancy is generally due to either infertile mating or sexual excitement caused when one doe rides another. It lasts on an average for 17 days. After 18 to 22 days the doe may give evidence of termination of false pregnancy by pulling fur and attempting to make a nest. She should be mated again.

Test mating is carried out to determine whether a doe has conceived or not. If on being placed in a buck's hutch, the doe growls and avoids the buck it is a fairly good sign that she is pregnant.

Pregnancy and kindling :—The rabbit is a very sensitive and nervous animal. A pregnant doe should not be disturbed by noise and handled only when it is absolutely necessary. As she begins to make her nest two to four days before kindling plenty of soft hay or straw or pine leaves should be placed in time in the enclosed part of the hutch. After she has made her nest, she will cover it with fur which the doe pulls from her own body. If a doe starts to pull her fur before she is expected to do it normally, she has perhaps missed and should be mated again.

Pregnant does should be fed and watered liberally. During the last 3 days extra grains and fresh water must be kept in the hutch throughout the period. At the time of kindling the doe develops an abnormal appetite

and thirst. In the absence of feed and water she may destroy and eat her young ones.

Young rabbits are born blind and naked. Eyes begin to open about the tenth day and are completely open on the 16th day. The young begins to eat with the mother when 20 days old. Until this time the doe and her young should not be disturbed or handled otherwise she is likely to desert or destroy her litter. Negligence of these minor points often leads to disastrous results.

Nursing and weaning :—First two months are very critical for the young rabbits in their existence. When about 7 to 8 weeks old, they should be weaned from the doe and allowed to run on the rabbit run for exercise for their proper health and growth.

The doe is given 7 to 10 days rest to recoup her before being mated for another family.

The young rabbits are sexed at 12 weeks and kept separately. The sex is determined by opening the aperture just in front of the anal opening. After 4 months of age the males are kept separately as they get quarrelsome and injure each other. At the time of weaning the rabbits may be selected for the breeding purposes. A male should not be used for service before he is one year old.

Handling of rabbits :—The right way to handle a rabbit is to grasp the loose skin over the shoulder with one hand and put the other under the hind quarters bearing the whole body weight and lift. Never handle by the ear as serious injuries might result.

DISEASES

Rabbits frequently fail to show symptoms of disease until they are very ill and therefore prevention of diseases should be aimed at. Curative treatment may become too late. General hygienic measures, strict segregation in small lots in the pre-epizootic phase and destruction of the infected animals are the only methods to be adopted to combat an outbreak of any infectious disease in a rabbitry. I shall mention only some of the important diseases.

1. *Coccidiosis* :—This is often the cause of severe epizootics of hepatitis and enteritis in young rabbits upto 3 to 4 months of age and hence it is of immense importance to rabbit breeders. The mortality is always high. It is common in wet weather.

2. *Etiology* :—i. *Eimeria stiedæ* of the liver of the rabbit causing hepatitis.

ii. *Eimeria perforans* is parasitic in the intestinal epithelium of rabbits and causes fatal enteritis.

Symptoms:—Gradual emaciation and diarrhoea. Sometimes faeces are blood stained.

Lesions are chiefly confined to the liver or digestive tract or both. The liver is enlarged and practically studded with numerous small white areas usually elevated slightly above the surface of the organ. Congestion and pin-head white specks are seen in the mucous membrane of the intestines.

Diagnosis by demonstrating coccidia in the liver nodules and intestinal contents.

Infection is carried from host to host by ingesting the ripe oocysts, the walls of which dissolve in the duodenum liberating the sporozoites. The immature oocysts are passed in the faeces and under favourable conditions of temperature and moisture develop into mature infective ones in about 48 hours. This is the weak point where we can break the life cycle of coccidia by the daily cleansing of the hutches and equipment. This removes the oocysts which do no damage to the stock when picked up within 36 hours of being excreted in the faeces.

Prevention:—1. Daily removal of faeces from the hutches and strict attention to hygiene are very important.

2. Rabbits of different ages should always be reared in different lots and on no account should young rabbits be allowed to mix with adults as they generally act as carriers.

3. Rabbit's faeces should not be used for manuring the land where greens for rabbits are grown.

4. The plots where greens for rabbits are grown should be made inaccessible to the wild rabbits by screening or other devices as they act as reservoirs of infection and may contaminate the greens by their faeces.

Treatment:—Both for prophylactic and curative purposes Sulphaguinidine in 0.5 to one per cent concentration of mesh may be given for 3 days and should be repeated after a week.

Sulphadiazine and Sulphamezathine are reported to be more effective when given before 5th day after infection and are not effective at all when merozoites have entered the epithelial cells. Hence they are of no use to the field worker.

2. **Pasteurellosis:**—The causative organism is *Pasteurella leptiseptica* and is often present in a carrier form. These carriers may prove a source of danger, for, if the condition of the stock is lowered the disease may flare up and cause heavy losses. The carrier itself may break down due

to moisture in the air at the beginning of the monsoon resulting in its becoming a victim to the disease or it may remain healthy but transmit the disease to other animals. Every rabbit with rhinitis and snuffles should be looked upon with suspicion.

In the last week of July 1945, an acute outbreak of pasteurellosis occurred in a compartment containing 25 rabbits with cent per cent mortality. The outbreak was diagnosed on the spot by Mr. Rajagopalan, research Officer of the Indian Veterinary Research Institute, Mukteswar. The following symptoms and lesions were observed.

- Symptoms* :—1. High temperature ranging between 104 to 105°F.
2. Diarrhoea with loss of appetite.
3. Death within 12 to 36 hours.
4. In some rabbits great excitement and violent struggling before death.

- Lesions* :—1. Subcutaneous haemorrhages.
2. Great congestion of lungs, liver, peritoneum and ecchymosis of intestines.
3. No enlargement of spleen.

Treatment is of no avail. It is only symptomatic and palliative.

Sulphadiazine may be tried as it has been reported effective in *Pasteurella pestis* infection in human beings.

Prevention :—1. Prompt and strict segregation to check the spread of the disease.

2. In actual out-break, 5 c. c. of H. S. serum subcutaneously. The immunity lasts only for ten days.

3. The best procedure is to protect the rabbits at the beginning of the monsoon with an autogenous vaccine; but inoculation of rabbits with one c. c. of H. S. Vaccine has been tried here and found to confer a solid immunity to tide over the monsoon season. Last year again pasteurellosis broke out amongst the young unvaccinated stock and not a single vaccinated rabbit though kept in the same building was affected. Thus the efficacy of vaccination was proved.

4. Detection of carriers is very important. Pass a sterilized swab into the anterior nares after swabbing with alcohol and give a twist so that a spot of blood comes on the swab which is sufficient for culture purposes.

5. Sterilization of feed receptacles.

3. *Salmonellosis* :—It is very common in the guinea-pigs and many outbreaks are on record. No acute epizootic of salmonellosis, so far I know, has been recorded among rabbits in India. This year salmonella

infection first started here in the guinea-pigs in a very virulent form and from these, it spread to a compartment containing 40 rabbits of about 4 months' of age. Out of these we lost 36 rabbits.

At autopsy acute septicaemic lesions were observed. There was congestion of lungs, liver, peritoneum and marked enlargement of spleen. Organisms were recovered from heart blood, liver, and lung cultures.

General emaciation with loss of appetite was the only symptom observed. There was no marked rise of temperature.

The problem is complicated by the fact that 2% rats and mice which are liable to contaminate food stuffs, carry *Salmonella enteritidis* and *Salmonella typhimurium*.

Prevention:—1. The rabbit house should be rat proof.

2. Carriers should be detected and eliminated by culturing faeces on Mac-Conkey's agar and doing other tests for identifying the *Salmonella* organisms.

4. "*Snuffles*" or *Nasal Catarrh*:—A cold is always a matter of concern in a rabbit and should receive immediate attention. It is called snuffles, when bacterial in origin and *Pasteurella lepi-septicus* and sometimes *Brucella bronchisepticus* have been isolated. Nasal Coccidiosis due to *Eimeria stiedæ* is also a cause of nasal catarrh. The disease may manifest itself in an acute or chronic form.

The symptoms of snuffles are sneezing, nasal discharge recognised first by wetting of hair around the nasal openings, which in few days becomes thick and purulent. In bacterial type cold may extend and cause pneumonia. In nasal coccidiosis inflammation of eyes is often present.

Treatment is simply symptomatic and palliative. Inhalation of Euclyptus oil and Tincture Benzoin Co-vapour relieves the symptoms.

5. *Rabbit Syphilis* or *Cutaneous Spirochaetosis* is a naturally occurring venereal disease of rabbits due to *Treponema cuniculi*.

Lesions consist of small scaly patches often slightly eroded and covered with a brownish crust, situated on the genitals or in the perineal region. Sometimes the nostrils and eye-lids are affected. The *Spirochaetes* are found in large numbers in scrapings from the lesions and are apparently confined to the superficial layers.

The disease is readily cured by intravenous injections of arsenical preparations or by local application of mercury ointment.

The affected rabbits till cured should not be used for breeding.

6. *Paralysis*:—Mostly met with in rabbits under 3 months of age and is probably the most difficult disease of all to cure. Hind quarters are

generally affected and the rabbit becomes so powerless that it drags its hind legs along the hutch floor. Injuries, damp hutch, filthy environments, and diseased kidneys are the predisposing causes.

I have seen some animals recover gradually even without any treatment. Small doses of brandy and milk may be given.

7. *Ear mange or ear canker* :—It is due to *Psoroptes cuniculi*. There is a creamy discharge in one or both ears, which though thin at first, rapidly becomes waxy and dark yellow in colour. The condition can be diagnosed by examining unstained scrapings under low power for the mite.

Treatment :—Remove the scabs and apply the following :—

Mercuric chloride	...	1 part.
Glycerine	...	100 parts.
Ethyl alcohol (50%)	...	200 parts.

8. *Megrims or dizziness* :—The rabbit carries its head on one side or swings it sideways. It is a kind of Paralysis. A few grains of powdered camphor in luke-warm water given once a day is found useful.

9. *Vent disease or Sexual inflammation* is often caused by the buck due to indiscreet pairing. Separate the animal, wash the part with any antiseptic lotion and apply carbolised vaseline.

10. Amongst other diseases are Virus III infection of rabbits and "Infectious Myxomatosis of rabbits" of which nothing is known in India.

Acknowledgment :—My thanks are due to Major P. K. Toya, M.B., B.S., D.P.H., Superintendent of the Government Vaccine depot, U. P. Patwadangar, for the facilities provided and the valuable suggestions in writing this article.

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IIZUKA'S TEST FOR FLUOROSIS IN BOVINES *

By

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Introduction.—The object of this paper is to present a very simple and practical test for diagnosis of Fluorosis in animals. To detect early cases of Fluorosis is essential for prompt preventive measures to be adopted. This test was first demonstrated by Dr. Akio Iizuka of the Veterinary Laboratory, Ministry of Agriculture and Forestry, Tokyo, in the diagnosis of equine osteomalacia; A. K. Gomaz and Arcadio C. Sonsays of the Veterinary Science College, University of Philippines, Manila, conducted this test on more than 12 horses suspected for *osteoporosis*. These two later authors read a paper in the Congress of the Philippine Veterinary Medical Association held in Manila, in February 17-18 (1938). R. Swaminathan (1939) Lecturer in Surgery, Veterinary College, Madras, applied this test for Osteoporosis in horses.

The author of this paper conducted investigation work in Fluorosis in cattle rather extensively in the districts of Kurnool, Nellore, Cuddappa and Anantapur in the Madras Presidency and studied the post-mortem and lists of pathological lesions of bones found in the disease. Diffuse sclerosing processes as well as a generalised condition resembling osteomalacia have been observed in most typical cases. In the skull there is a tendency for the mediary suture to give way while the other sutures are found loosely united. The mandibles of the lower jaw are found disunited at the symphysis. The long bones are found reduced in weight and they become light. Pitting and selective abrasions are found in the teeth. As such the author thought that the Iizuka's test which has been found very useful in early cases of equine osteoporosis might be useful similarly in detecting cases of Fluorosis at a very early stage.

The test.—Doctor Iizuka's instrument consists of a pointed stylet measuring 2 c.m. in diameter and 3.5 c.m. in length attached with a nut to a handle that is similar in appearance to an ordinary trocar. The author used only an ordinary metallic exploring needle for the purpose.

To use this instrument, the head of the animal is held in position slightly horizontally restrained by the nosestring and horns. The needle is inserted with a steady and moderate pressure into the frontal sinus. The proper point for insertion is near the middle of an imaginary line connecting the inner canthus of the eye and one inch above in the median

* Paper read at the 34th Session of the Indian Science Congress held at Delhi in January 1947.

suture. A positive test is indicated by the case with which the needle can be inserted into the bone without evincing pain and also by the needle standing at right angles to the point of insertion. In negative cases the insertion cannot be made and besides the needle will be flat on the skin without any hold in the frontal bone.

AEGYPTIAELLOSIS IN FOWLS

By

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Carpano (1930) reported this disease from Albania, where it occurred in a severe form among fowls along with Spirochaetosis. Information is scanty on the incidence, distribution and the economic loss caused by *Aegyptianella pullorum* in India, although this has been reported from several parts of this country occurring in a sporadic form.

The following is a brief account on the investigation into this infection carried out at the Government Poultry Farm, Patancheru, during the month of March 1947.

A. pullorum infection gives rise to symptoms only in those birds whose resistance is lowered by other causes such as contagious and parasitic diseases, malnutrition and tick infestation.

The disease occurred as an outbreak among 250 chicks of 1½ to 3 months of age, which used to be kept during the night in a chunnam-plastered mud house. This house was later found to be infested with ticks-*Argas Persicus*. Enquiries revealed that there was about 30-40% mortality in this flock, mainly due to pronounced anaemia which is very commonly met with in this disease. Concurrently, fowl-pox was prevalent and accounted for another 10-12% of deaths,

Symptoms:—About 50% of the affected chicks showed symptoms of pronounced anaemia. There was no rise of body temperature and on the contrary it was either normal or sub-normal. The birds appeared huddled up, showing un-kept feathers. Dullness, inappetance and diarrhoea together with symptoms or paralysis of legs and wings were also observed. The chicks on account of extreme weakness in the legs, were unable to stand and often lay prostrate on the ground. The whole flock was found infested with ticks - *Argas Persicus* (larvae).

Carpano (1939) reported the disease occurring in an acute and chronic form. The acute form is characterised by anorexia, diarrhoea and rapid death, while the chronic form shows digestive disturbances, diarrhoea, jaundice, anaemia and paralysis.

The outbreak in this case is only of a chronic nature.

Blood Picture.—The organisms are intra-corpuscular and invade only the Red blood corpuscles. About 39 blood smears collected from the clinically affected chicks, were examined microscopically, which revealed 80 per cent of the Red blood corpuscles infected.

Smears stained by the Leishman's method revealed different forms of organisms (vide Plate VII) such as ring forms, crescentic forms, anaplasmod forms etc. (Plate VII fig. 11). As the parasite matures it breaks up into chromatinic granular messes round the periphery of the organism, producing rosette-like forms (fig. 1). These organisms usually occur singly in the Red blood corpuscles though in severe cases two or more bodies are not infrequently met with.

Diagnosis is usually arrived at by microscopic examination of blood during life.

Post-mortem.—Post mortem examinations conducted on about 20 dead fowls revealed no lesions characteristic of the disease, except a slight enlargement of liver and spleen with a few necrotic patches in the liver. Impression smears made from the tissues of lung, liver, spleen, kidneys and heart blood smears showed numerous organisms of *A. pullorum*, but these examinations are useful for diagnosis only in fresh carcasses.

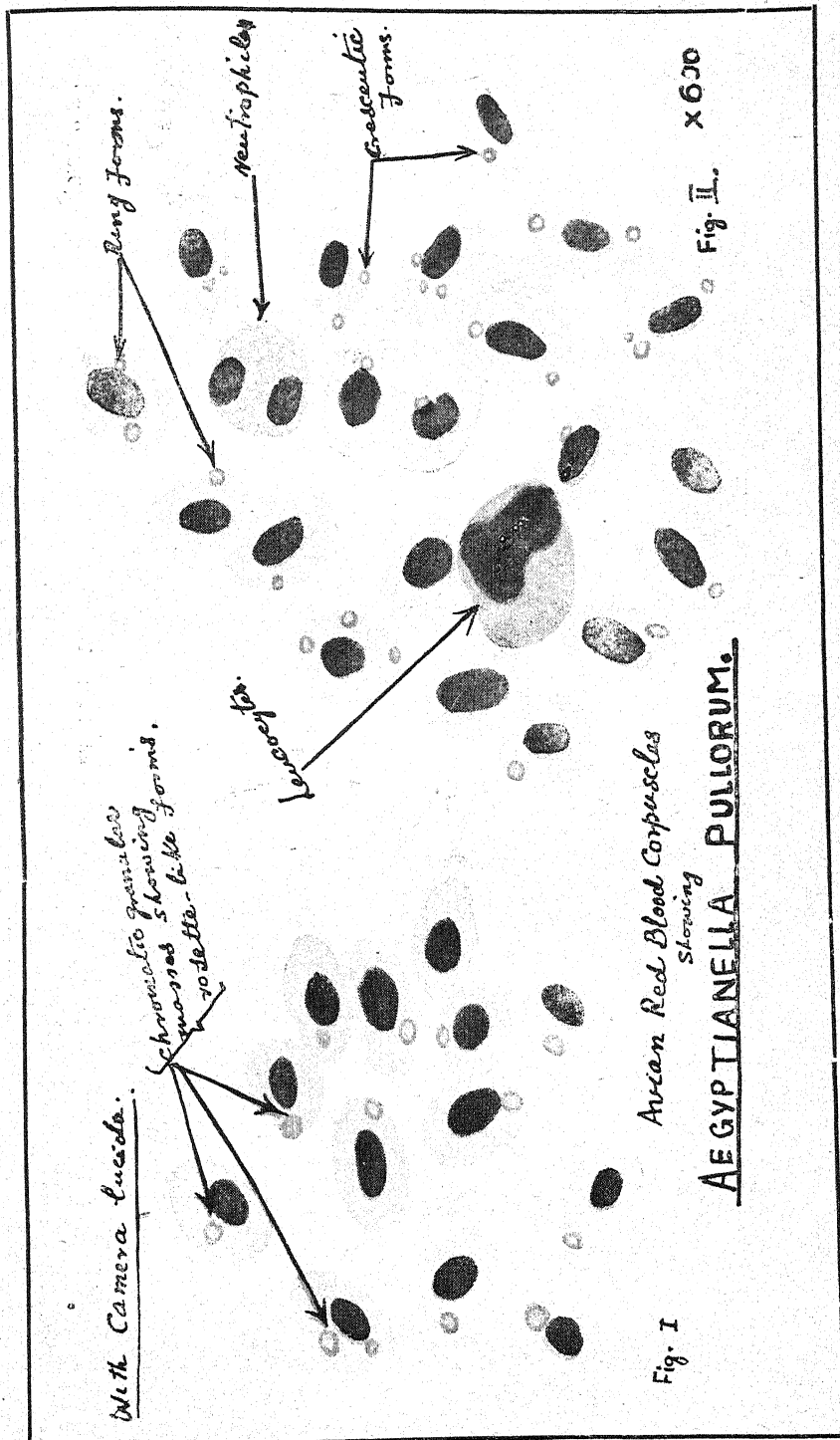
Transmission:—This was conducted by infecting one healthy white leghorn pullet by intramuscular injection of blood from a natural case of aegyptianellosis. The organisms appeared in the peripheral blood four weeks after the inoculation. The pullet showed no perceptible sign of illness during the period of infectivity. This fact also suggests that infection with these organisms can only produce symptoms of a chronic nature in those birds whose vitality is reduced by some other intercurrent diseases or other factors.

Blood smears from about six positive cases were sent to the Protozoologist, Indian Veterinary Research Institute, Mukteswar, who reported that the smears showed numerous organisms of *A. pullorum*.

Treatment:—With regard to treatment, various drugs have been recommended as under.—

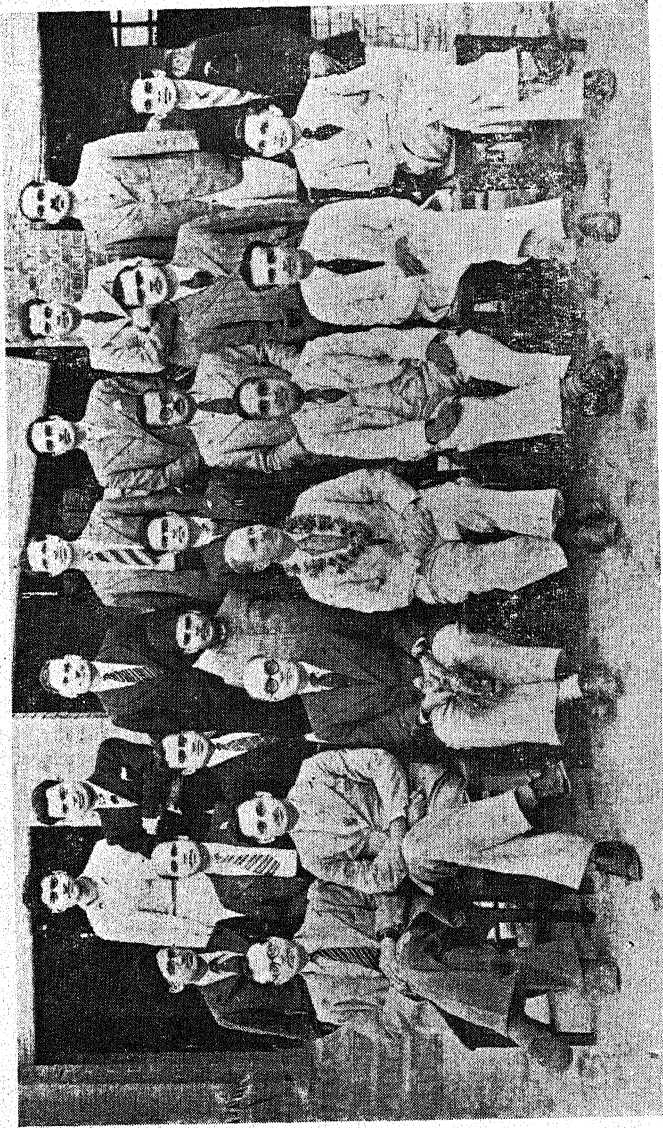
1. **Trypan blue.**—1 c.c. of 1% solution of this drug may be given parenterally, but this does not clear the peripheral blood with the organisms. No doubt it does lead to rapid improvement in their general conditions.
2. **Acaprine.** 0.2 c.c. of 5% solution may be injected intramuscularly 3-4 times periodically.

AEGYPTIAELOSIS IN FOWLS.



INDIAN VETERINARY RESEARCH INSTITUTE, IZATNAGAR.

Advanced Course in Poultry Husbandry. 1946-47.



Sitting :—Dr. H. N. Ray; Dr. N. D. Kehar; Dr. G. D. Bhale Rao; Dr. F. C. Minett (*Director*); Mr. S. G. Iyer (*O.C., P.R.S.*);
Dr. P. Bhattacharya; Mr. M. A. Ali.

Standing I Row :—Messrs. M. M. Rafiq (*Punjab*); P. C. Pattanaik (*Orissa*); K. Purushothaman (*Madras*); S. M. Ghazi (*Hyderabad*);
H. P. Tandon (*Patiala*); V. P. N. Nadar (*Madras*); J. R. Kapur (*Punjab*); M. A. Rahman (*Assam*).

Standing II Row :—Sharafat (*Lab. Attendant*); Messrs. Prem Nath (*Punjab*); S. L. Talwar (*I.V.R.I.*); S. N. Mehta (*Punjab*);
J. N. Arora (*U. P.*); S. G. Dixit (*Bombay*); D. T. Parnaik (*Bombay*).

3. *Stovarsol and Acetylarsan*.—Messrs May & Baker, Ltd., Bombay, suggested the use of these medicines in this affection. Although these drugs do not kill the organisms, they were reported to have a favourable effect on anaemia which is generally associated with this condition. The efficacy of these two drugs was observed in Spirochaetosis, where they produced the desired effect in combating the disease.

The author has tried trypan blue and Stovarsol in cases of aegyptianellosis and found them effective.

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BACTERIOLOGY OF BOVINE MASTITIS IN INDIA WITH SPECIAL REFERENCE TO THE INCIDENCE OF *STREPTOCOCCUS AGALACTIAE* *

By

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Veterinary clinicians in India have been quite familiar with mastitis as an affection of milch cattle but it was not until the beginning of the last decade that the subject received serious consideration. The investigations of various workers in Europe and North America supplied the much needed stimulus in this direction, so that from 1935 the subject has been given more attention than before. In this paper is given a consolidated summary of the work done from 1935 to 1942. This includes a systematic survey of the incidence of *Streptococcus agalactiae* infection in some dairy herds. The main object has been to obtain some preliminary knowledge of the bacteriology of bovine mastitis in India. The work was started primarily to determine the common bacterial types associated with it, and secondly, the extent to which *Str. agalactiae*, the most important and common cause

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of chronic streptococcus mastitis in other countries, is responsible for udder infections in this country.

The observations made are described under two sections 1 and 11.

SECTION I

Under this head is described the preliminary work done from 1935 to 1940 to determine the types of bacteria associated with mastitis, and especially to see if *Str. agalactiae* could be commonly isolated.

MATERIAL AND METHODS

The material examined came, as a rule, from cows and buffaloes affected with clinical mastitis in the experimental dairy herds at Mukteswar or from different parts of the country. In the case of the Mukteswar cows, the material consisted of mixed udder milk or more commonly milk from affected quarters. The technique adopted was to streak the centrifuge deposit on blood or plain-agar slants for primary isolation of bacterial types. In many cases, cultures were obtained with a fair degree of purity. The material received from the field was generally milk or a more or less purulent udder secretion, swabs of milk or pus, and in one case a portion of the affected mammary gland preserved in glycerine. The cultural technique adopted with these specimens was similar to that used for milk from the Mukteswar cows. In many cases, films of the udder secretion or milk deposit were also examined for bacteria and pus-cells. Many of the Mukteswar cows and a couple of 'field' cows were re-examined.

The bacteria isolated in pure culture and suspected of being connected with the disease were studied. In the early stages of the work, the system of classification recommended by Bergey was used. This largely explains why *Str. agalactiae*, though probably present, was not definitely identified until 1939, after which it became the general practice to submit all the streptococcus strains to the biochemical tests now recommended for classifying mastitis streptococci.

RESULTS

Only the more important features are given below.

1. *Streptococci*. About 55 strains of streptococci were recovered from 45 animals (18 Mukteswar and 27 'field' animals). Few of these strains were subjected to a thorough examination, so that the identifications recorded would not satisfy modern standards. The more definite and reliable specific labels are considered below.

(a) *Str. agalactiae*. *Str. agalactiae* was isolated from ten cows and one buffalo; seven of these were 'field' cows. This number also includes one *Str. mitior* strain which on later examination proved to be *Str. agalactiae*. At least one other strain, which had been considered to belong

to 'Mastitis Streptococcus, Group 1' Minett Stableforth and Edwards) may have been a true *Str. agalactiae*, but it was not available for further examination.

(b) *Str. mitior*. *Str. mitior* was isolated from three cows, two of which were 'field' cases, and one buffalo. Perhaps all, and certainly one, of these strains should be regarded as *Str. agalactiae*. The buffalo strain was not available for further examination, but the animal itself was two years later found to be infected with *Str. agalactiae*.

(c) *Str. uberis*. *Str. uberis* was said to have been isolated from two 'field' cows, but the diagnosis was based on incomplete study. Organisms labelled 'haemolytic diphtheroids', probably *Corynebacterium pyogenes*, were also recovered from these cows.

(d) *Str. subacidus*. The characters of this organism are fully described in section 11. Strains of streptococci possessing such characters were recovered repeatedly from two Mukteswar cows. During the later survey work, one of these proved to be infected with *Str. agalactiae*, but from the other *Str. subacidus* was again recovered.

(e) *Str. pyogenes*. *Str. pyogenes* (i.e. strongly haemolytic streptococci belonging to Lancefield's group A) was not isolated from a single case.

2. *Staphylococci*. *Staphylococci* considered to have pathogenic importance were isolated from about 20 animals. None of these strains was actually tested for its pathogenicity, but a few were found to be haemolytic and coagulase positive. Their characters are further described in Section 11.

3. *Diphtheroids*. Many of those isolated were obviously nonpathogenic. *C. pyogenes* was isolated in practically pure culture from purulent udder secretions of five 'field' cows and one 'field' buffalo. Two more strains from 'field' cows and labelled 'haemolytic diphtheroids' were probably true *C. pyogenes*. In all these, there was a history of suppurative mastitis. The cultural and other characters of these strains corresponded to those of classical *C. pyogenes* from mastitis and other disease conditions, viz. small Gram-positive organisms, forming minute haemolytic zones in blood agar, digesting milk and gelatine and solid serum, and giving acid in lactose and not mannitol. Another character, perhaps not previously described, was their power of hydrolysing hippurate, like *Str. agalactiae*, but to a somewhat lesser extent, especially when grown in media containing a little ox-blood serum. This property was manifested by all the mastitis strains as well as by those from other sources.

4. *Bacterium coli*. *Bact. coli* and coliform organisms were isolated from several cows. From one cow and one buffalo at Mukteswar,

haemolytic strains of *Bact. coli* were recovered repeatedly and this organism probably caused the somewhat acute mastitis occurring in these animals.

5. *Mycobact. tuberculosis*. Although a number of tests were made, there is but one case in which tuberculosis of the mammary gland was established by cultural and biological tests.

6. *Miscellaneous bacteria*. Among other bacteria of doubtful pathogenicity, the outstanding organisms were strains of *Proteus* and *Pseudomonas*.

SECTION 11. SYSTEMATIC SURVEY

After *Str. agalactiae* as a cause of bovine mastitis in India had been definitely established, it was decided to institute a general survey of the incidence of udder infections due to this organism in a few organised dairy herds. The results are shown in table 1.

MATERIAL AND METHODS

A total of 541 cows, including four buffaloes, belonging to 15 dairy herds in different parts of the northern India, were examined. The 16 cows included as Herd 13 really consisted of animals admitted to the Punjab Veterinary College from various parts of Lahore; they are herded in this way for descriptive purposes. Milk samples were taken from the individual quarters of nearly all cows available in the different herds. In a few cases, one or more teats were 'blind', and in each of two animals only one quarter was available.

As the main object was to determine the incidence of *Str. agalactiae* infections and since it was also desired to make some simultaneous observations on the incidence of *Staph. pyogenes* infections, the cultural technique employed was essentially the same as that used by the English workers (Minett, 1934) viz. to centrifuge about 10 c.c. of foremilk collected cleanly from the individual quarters and to show the deposit in 5 per cent ox-blood agar plates. As a rule, two plates were made from each sample. In the first half of the deposit and in the second one-tenth of this amount was taken. When the deposits were particularly heavy or when there was reason to suspect a high bacterial count, plates were sown from further dilutions. Plates were examined at 24 and 48 hours incubation and the type of colonies noted. Suspicious colonies were transferred to one percent serum broth for morphological study and purification (blood agar surface). *Streptococci* were tested in the following manner. Type of hæmolysis was noted in the primary growths from the deposits. Intensity and character of growth in serum broth were noted after 24 and 48 hours and morphology was studied (chain formation, Gram staining). Fermentation tests were in lactose, sucrose, mannitol, salicin, sorbitol, trehalose, raffinose and inulin, all in one per cent solutions and containing one per cent each of ox-serum and And-rade indicator. Also noted were final pH in glucose broth (one

per cent) hydrolysis of sodium hippurate, changes in litmus—milk and methylene blue-milk (1:20,000). Unless otherwise stated, observations were made during one week at 37°C.

RESULTS.

The main results are summarized below. Table 1 should be seen again.

1. *Streptococci*. One hundred and twenty-four strains of streptococci, isolated from 87 cows and one buffalo, belonging to 12 herds, were classified as follows.

(a) *Str. agalactiae* was definitely diagnosed in two herds and suspicious strains were isolated from three more herds. The ten suspicious strains came from eight cows as follows: four from two cows at Izatnagar and six from six cows in the neighbourhood of Lahore. The ten authentic strains of *Str. agalactiae* were isolated from eight cows and one beffalo. Thus, in this survey the percentage of animals definitely infected with this organism is less than two. One of the infected herds at Mukteswar (Herd 1) contained at the time of examination 30 cows, mostly crossbreds, and four buffaloes in milk. *Str. agalactiae* was isolated from three cows and one buffalo. There were also one cow and one buffalo in this herd previously shown to be infected with *Str. agalactiae*. Two other cows, which were apparently free from pathogenic streptococci in this survey, were found to show *Str. agalactiae* at a previous examination (Section 1), but the quarters form which these organisms were originally obtained were 'blind' at the time of the survey. Obviously pathogenic streptococci were also recovered from five more cows of the same herd. It is interesting to note that in herd 2, Mukteswar, which consisted of the small Afghan and Kumaoni hill cows, *Str. agalactiae* was not encountered. From the second infected herd (Herd 3, Patna) six strains of *Str. agalactiae* were recovered from five of 83 cows examined. Seventeen more strains of streptococci, which could not be properly classified but which were probably of little pathogenic significance, were recovered from 13 other cows of this herd.

The main cultural and biochemical characters used for classifying *Str. agalactiae* and possessed by all stains accepted as *Str. agalactiae* in this work as follows.

Haemolysis. *Str. agalactiae* was easily recognized by the comparatively small width and weak character of the B-haemolytic zones about the deep colonies in ox-blood agar plates after 24 hours incubation.

Growth. Growth in one or 5 per cent serum broth was moderately abundant, with clear supernatant and floccular sediment, sometimes faintly pigmented. The sediment was composed of medium to long chains of Gram-positive cocci.

TABLE I
Incidence of Streptococci, etc. from milk samples of 15 herds.

Herd No.	Pla	Time of examination	No. of cows examined	Total streptococcus strain isolated	Str. agalactiae		Other mastitis streptococci	Streptococci, probably non-pathogenic	Staph. pyogenes strains
					Authentic	Suspected			
1	Mukteswar	June-July 1940	30 and 4 buffaloes	12 (from 10 cows and one buffalo)	4 (from 3 cows and one buffalo)		(i) <i>Str. uberis</i> , 2 (from two cows) (ii) <i>Str. dysgalactiae</i> , One suspicious strain	2 (from two cows) including one of <i>Str. acidominimus</i>	30 (from 14 cows and 2 buffaloes)
2	do.	July 1940	12	24 (from 9 cows)				<i>Str.</i> <i>acidominimus</i> 24 (from 9 cows)	20 (from 7 cows)
3	Patna	April-May 1941	83	23 (from 18 cows)	6 (from 5 cows)			17 (from 13 cows)	40 (from 23 cows)
4	Izatnagar	December 1941	21	4 (from 2 cows)		4 (from 2 cows)			13 (from 6 cows)
5	Lahore	January 1942	99	3 (from 3 cows)				3 (from 3 cows)	16 (from 13 cows)
6	do.	do.	6						4 (from 3 cows)
7	do.	February 1942	34						(from 3 cows)
8	do.	do.	21	1				1	9 (from 7 cows)
9	do.	do.	21	4 (from 4 cows)		2 (from 2 cows)		2 (from 2 cows)	(from 7 cows)
10	do.	do.	21						(from 3 cows)
11	do.	do.	21	2 (from 2 cows)				2 (from 2 cows)	9 (from 6 cows)
12	do.	March 1942	30	1				1	(from 1 cow)
13	do.	do.	16	13 (from 11 cows)		4 (from 4 cows)		9 (from 7 cows)	(from 1 cow)
14	New Delhi	May 1942	54	29 (from 20 cows)				29 (from 20 cows)	40 (from 25 cows)
15	Karnal	do.	68	8 (from 6 cows)				8 (from 6 cows)	8 (from 7 cows)
	Total		537 cows and 4 buffaloes	124 strains	10 strains	10 strains			

Hydrolysis of sodium hippurate. This reagent was unmistakably hydrolysed (usual ferric chloride test, with unsown hippurate broth controls).

Final pH in one per cent glucose broth. This was generally low towards 4.2,

Litmus-milk. Fair inocula produced rapid acidity with firm clot formation within 24 hours, with some decolouration at the bottom. On further incubation, a clear reddish whey was expressed.

Methylene blue-milk. Generally, the results varied with the size of the inoculum. Small inocula failed to grow. Heavy inocula caused a complete reduction and clot formation within 24 hours, followed later by progressive oxidation from the top.

Sugar reactions. All strains produced acid in lactose, sucrose, salicin and trehalose, but not in mannitol, sorbitol, raffinose and inulin.

(b) *Str. uberis.* *Str. uberis* (Mastitis Streptococcus, Group 111, of Minnett *et al*) was isolated from two cows at Mukteswar. Both were α -haemolytic, gave abundant floccular growth in serum broth with clear supernatant, formed short to medium chains, hydrolysed sodium hippurate, produced a final pH 4.6-4.9 in glucose broth, acid in litmus-milk with small inocula but acid and soft clot within 24 hours with larger inocula, acid in lactose, sucrose, mannitol, salicin, sorbitol, trehalose and inulin, but not in raffinose.

(c) *Str. dysgalactiae.* *Str. dysgalactiae* (Mastitis Streptococcus, Group 11, of Minnett *et al*) was suspected in one cow at Mukteswar, but the reactions were not quite typical. Except for the type of haemolysis, these characters were not very different from those manifested by strains labelled as *Str. subacidus*. The organism was α -haemolytic, grew abundantly in serum broth as a floccular pigmented sediment with clear supernatant, short to medium chains, a final pH of 5.4 in glucose broth, no hydrolysis of sodium hippurate, acid in sucrose and trehalose. Small inocula in litmus-milk and methylene blue-milk gave no change, larger inocula caused a slight and incomplete reduction later returning to normal.

(d) *Str. subacidus.* This was the label given to a number of strongly β -haemolytic streptococcus strains isolated from various cows at Mukteswar and elsewhere, sometimes repeatedly and in large numbers, and often in association with *Staph. pyogenes*. These streptococci were considered to be definitely pathogenic and their main cultural and biochemical characters were as follows. typical streptococcus colonies, both deep and superficial ones being surrounded by wide zones of clear β -haemolysis; abundant and sometimes pigmented floccular sediment and clear supernatant in serum broth, chains of medium length; final pH of 5.2-5.6 in glucose broth; hippurate not hydrolysed; acid and slowly-formed incomplete clot in

litmus-milk with slight reduction at bottom; small inocula producing no change in methylene blue-milk but larger inocula causing complete reduction with clot formation; acid only in lactose, sucrose and trehalose.

Two of these strains were tested for pathogenicity, using 0.5 c.c. serum broth culture intraperitoneally. Both were non-pathogenic at this dose.

(e) *Str. acidominimus*. Twenty five strains, isolated from ten cows at Mukteswar, had the characters of this species. There was no evidence of mastitis in these cows and the streptococci appeared to be saprophytic. Their salient characters were: alpha-haemolysis; slight uniform turbidity in serum broth, short to medium chains; final pH 6.6 in glucose broth, comparatively weak but definite hydrolysis of sodium hippurate; no change in litmus-milk or methylene blue milk; very weak acid in lactose, sucrose, and trehalose.

(f) *Unclassified*. Seventy-three strains isolated from 56 cows could not be properly classified. Most were considered of no direct pathogenic significance.

2. *Staphylococci*. These commonly found organisms were divisible into two main groups (Minett, 1937).

(a) *Saprophytic staphylococci*. (i) Colonies unpigmented or white pigmented, superficial ones often resting on a bed of clear haemolysis but deep colonies either non-haemolytic or surrounded by zones of greenish discolouration, (ii) Colonies pigmented yellow or somewhat like '*Staph. aureus*' or, as in one case only, like '*Staph. citreus*' generally with no evidence of haemolysis around either deep or superficial ones; (iii) Small colonies, the deeper ones more minute and often surrounded by fair sized zones of intense greenish discolouration. Organisms of the last group had a characteristic tendency to form tetrads. In ox-blood agar plates, their minute deep colonies were sometimes liable to be mistaken for streptococcus colonies. The few strains studied of these different types were found to be non-proteolytic and failed to form coagulase or soluble haemolysis.

(b) *Staph. pyogenes*. Colonies generally pigmented like '*Staph. aureus*'. Deep colonies were surrounded (i) in several cases, by wide and well-defined zones of darkening, characteristic of β -toxin; (ii) in a few cases, by moderate-sized zones of clear haemolysis, characteristic of α -toxin; and (iii) in most cases, immediately by comparatively narrow zones of clear haemolysis and peripherally by wider zones of darkening, indicative of both α - and β -toxin. Storage in the cold brought about progressive changes in these different types of haemolysis characteristic of pathogenic staphylococci of bovine origin. Superficial colonies were generally haemolytic. A few strains studied were found to produce soluble haemolysin; they were actively proteolytic (gelatine), generally fermented mannitol and invariably formed coagulase for rabbit plasma.

Staph. pyogenes was encountered in 204 quarters of 126 cows and two buffaloes i.e. in nearly 24 percent of all animals examined. No herd was found completely free from infection with this organism and in some the incidence was nearly 60 per cent. In many cases the colonies obtained were very numerous, and it seems that *Staph. pyogenes* may be regarded as the commonest cause of udder infections in this country. It was, at any rate, found to be common in milk from cows which had developed acute inflammation of the udder, generally *post-partum*. With suitable treatment and care, such udders tended to return to normal, but the worse affected quarters continued to excrete the organism in gradually decreasing numbers for some time. Similar affections also seem to be associated with other bacteria and occasionally, especially when examined quite early in the onset, it may not be possible to recover any organism of pathogenic significance.

DISCUSSION

It is hoped that this work may provide preliminary information on the general bacteriology of the diseased bovine udder in India and may furnish some information on the incidence of different types of streptococci, staphylococci, and other organisms recognized to be commonly associated with the disease in other countries.

The methods used for streptococci were restricted to their cultural and biochemical characters. Serological typing was not undertaken, partly because objects of the work did not demand it, partly because the typical strains of *Str. agalactiae* can be recognised without much difficulty by the methods used and partly because facilities for serological work were not available.

Since systematic examination for udder induration etc., was not done, it is not possible to give accurate information about the correlation between the different bacteria and the various kinds of udder affections. However, some information of a general character, based partly on the clinical history supplied and partly on a few clinical examinations has been incorporated.

SUMMARY

This paper gives an account of preliminary investigations, carried out from 1935 to 1942, on the general bacteriology of mastitis in cows and buffaloes in India. Systematic examination of the udder for induration, etc., was not taken up.

The first section deals with the examination of over 100 specimens of udder secretion from 85 cows, including a few buffaloes, affected with clinical mastitis in different parts of the country.. The second section is concerned with a systematic examination of 541 cows from about 15 different dairy herds in the northern India.

3. Bacterial infections of the bovine udder in India correspond fairly, in type and cause, to similar infections in other countries.

The existence of *Str. agalactiae* has been established in both cows and buffaloes at a number of places, but the incidence is low. In the preliminary work, several strains of *Str. agalactiae* were recovered from cows and buffaloes affected with clinical mastitis. In the systematic survey, ten authentic strains and ten suspicious strains of *Str. agalactiae* were isolated from cows and buffaloes belonging to five herds.

Other streptococcus groups occasionally found were *Str. dysgalactiae* in one cow with subacute mastitis, *Str. uberis* in two cows with a history of mastitis, and *Str. subacidus* from a few cows mostly with a more or less acute mastitis. There were also several strains of streptococci, mainly from apparently healthy quarters, which were not properly classified. There was no authentic case of *Str. pyogenes* (Lancefield group A) infection.

Among other well recognised pathogens of the bovine udder were:

(a) *Staph. pyogenes*, of which some 250 strains were isolated from nearly 140 cows; this organism was held responsible, alone or in conjunction with others, for some acute *post-partum* mastitis and for much chronic low grade mastitis.

(b) *Corynebact. pyogenes* was isolated, often in pure culture, from about five cows and one buffalo with suppurative mastitis.

(c) *Bact. coli*, and other coliforms, were isolated from several animals and seemed to be definitely pathogenic in at least one cow and one buffalo.

(d) Other organisms of possible importance were three strains of *proteus* and one strain of *Pseudomonas*.

ACKNOWLEDGEMENTS

Space does not permit individual acknowledgement to all officers who were on different occasions connected with this work. The two outstanding contributions have been from Messrs. P. R. K. Iyer and B. N. S. Chowdhury. The former was responsible for many of the findings reported in Section 1, and the latter did much of the work on animals at Lahore. The writer is grateful to Mr. J. F. Shirlaw for encouragement and help in arranging facilities. The systematic survey reported in Section 11 was initiated by Dr. F. C. Minett, to whom I am also indebted for arranging and correcting this paper.

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*BOVINE MASTITIS IN ORISSA

By

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The serious economic loss sustained annually, by the cattle owners of our country, due to ravages of mastitis, has long been recognised; and it is unnecessary for me to go over the various causal factors responsible for this complaint. In this paper I will simply record my observations on the incidence of the disease in the Government Civil Dairy at Cuttack, Orissa.

The nucleus of this Dairy consisting of 13 milch Hariana Cows and 8 milch Murrah buffaloes was laid at Cuttack, within the office compound of the Deputy Director of Veterinary Services, Orissa in the month of May, 1944 to solve to a certain extent the milk problem of the town.

On 17-8-44 one lactating cow (H. P. 1) with history of inflamed udder was brought to my notice. She was given one drachm of formalin in one pint of water orally, daily for three consecutive days, with local application of camphorated oil to the affected udder. Her milk samples revealed G+ Streptococci indistinguishable from streptococcus agalactiae on laboratory examination on 19-8-44. She was given intramammary infusion of 75 c.c. of 1:5000 freshly prepared solution of acriflavin into the affected left hind quarter on 20-8-44. The fluid was completely withdrawn after five minutes. The oral administration of formalin and local application of camphorated oil was discontinued as the swelling of the udder had subsided.

This case of streptococcal infection in the Dairy gave us a warning to undertake a whole-herd-test and this was performed during the period from 25-8-44 to 2-9-44. One dry cow (H. P. 9) revealed G+ Streptococcal infection of her left hind quarter, indistinguishable from Streptococcus agalactiae on laboratory examination. On 9-9-44 intramammary infusion of 1:5000 solution of acriflavin was given to the affected quarter. The fluid was freshly prepared and was infused by slow gravitation method at body temperature. It was allowed to remain overnight. Next day the fluid was completely withdrawn.

In order to maintain the continuity of milk supply to the permanent customers, a second batch of 15 milch Hariana Cows and 9 milch Murrah buffaloes were purchased in February, 1945 for the Dairy.

It was noticed that the milk yield of one cow (H. P. 6) and one buffalo (M. P. 3) purchased in the first lot, in their second lactation under

*Paper presented to the 2nd Annual General Meeting of the Orissa Veterinary Association for discussion held on 31-1-46,

Orissa condition was very poor and their yield was not even sufficient for their young ones, though they were giving fairly large quantities of milk in their first lactation in Orissa. A suspicion of streptococcal infection in the herd arose and whole-herd-test was undertaken from 25—12—45 to 17—1—46. Four cows (H. P. 6, H. P. 15, H. P. 27 & E. 4 and one buffalo (M. P. 2) revealed streptococcal infection in 9 of their quarters. Out of these, H. P. 6 and M. P. 2 were purchased in the first lot and H. P. 15 and H. P. 27 in the second lot; E. 4 was the progeny of one of the cows of the Dairy Farm prior to its being taken over by the Civil Veterinary Department from the Agricultural Department on 10—4—44. Two cows (H. P. 22 and H. P. 30—2nd lot) and one buffalo (M. P. 3—1st lot) remained suspicious. All the affected quarters of the cows and the buffaloes except E. 4 who was then in advanced stage of pregnancy, were infused with 75 c.c. of 1:5000 solution of acriflavin at body heat. The fluid was withdrawn completely after 5 minutes except from cow—H. P. 15, in which case the solution was allowed to remain for 15 minutes as she was in her advanced lactation.

Result of treatment:—Cow H.P. 1 gave a milk yield of 2191 lbs. in her 1st lactation of 364 days in Orissa. In her 2nd lactation in Orissa, commencing from 4th September 1945 till 31st January 1946 (i.e. in 150 days), she gave 1169 lbs. She is at present yielding on an average 5 to 8 lbs. of milk per day. There is no doubt that her milk yield will become greater than that of previous year's.

H. P. 9 in her first lactation has yielded 2271 lbs. and 9 ounces. She is now in her 3rd lactation in Orissa.

In each of the above 2 cases the milk yield has improved after treatment with acriflavin.

Observations made:—The milk-yield improved perceptively after treatment with acriflavin. This proves the high bactericidal property of acriflavin against streptococcal infection.

In lactating cows where animals are milked twice, the milk assumes normal colour only after 48 hours, i.e., after 4 milkings from the time the acriflavin solution was infused.

Acriflavin imparts no odour to the milk after treatment, though it does impart colour.

Of 11 quarters treated, 6 were of hind quarters and 5 were of fore-quarters. This is contrary to the observations recorded by others. I have, in course of my treatment come across the incidence of bovine mastitis of streptococcal origin more in hind quarters than in fore.

Incubated milk reveals a higher percentage of infection, than ordinary milk examination.

Treatment by acriflavin infusion depends upon the nature of infection (acute, sub-acute, or chronic) and on the state of lactation (in full or late lactation or in dry period) of the animal treated. In dry cows, cows in advanced lactation, cows in full lactation, the fluid (acriflavin solution) is allowed to remain in affected quarters for 24 hours, 15 minutes and 5 minutes respectively. More time is allowed in dry cows, because of the empty udder and less time is allowed in lactating cows for fear of clogging and blocking the teat canals.

The strength of acriflavin solution used in the treatment of mastitis should never be more than 1:5000 as otherwise it may destroy the milk secreting cells, instead of clearing out the organisms from them.

Slow gravitation method is generally used as it is very convenient to the operator and less harmful to the udder tissue.

Control Measures Taken:—In the year 1945-46 four fresh cows and 2 doubtful ones and 1 buffalo excluding 1 doubtful one were affected.

As a safeguard against further spread of the infection, periodic bacteriological examination of all cows and buffaloes of the herd is being carried out and arrangements have been made for milking the affected animals last.

Treatment is given to the animals in accordance with their state of lactation.

Clinical cases are milked last and are given oral administration of formalin one drachm in one pint of water with local application of camphor liniment to the inflamed udder.

The healthy animals are attended first so far as their feeding, cleaning, stripping, etc. are concerned.

Separate milking utensils are used for the infected animals.

Fresh arrivals are examined as soon as possible before they are allowed to mix with the rest of the herd.

Conclusion:—To ascertain the actual incidence of mastitis in cows, a regular survey should be carried out in the Province and a special officer (Bovine Mastitis Investigation Officer) should be appointed by the Government to carry out this work. The cattle owners in the rural areas should be induced to co-operate with this officer and get their animals periodically examined and the affected ones treated. The owners should be enlightened on the scientific methods of isolation, segregation and sanitary condition of their infected animals as far as practicable under rural conditions. This will solve the problem of "Bovine Mastitis Control" to

a considerable extent. If this procedure is adopted, the province, in my opinion, in the long run be a gainer from an economic standpoint.

ACKNOWLEDGEMENT

The writer is highly indebted to Mr. R. L. Kaura, Deputy Director of Veterinary Services, Mr. P. S. Kuppuswamy, Veterinary Investigation Officer, Orissa for the valuable instructions and help received from them from time to time while carrying out the treatment of animals of the Dairy Herd.

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Editorial

LIVESTOCK SECTION, MADRAS.

We are glad to learn that at its last meeting, the Provincial Livestock Improvement Board, Madras, has negatived the proposal to separate the Livestock Section from the Veterinary Department, and that the *status quo* is to be maintained. We are also glad to learn that the Government have created a post of a Joint Director of Veterinary Services to intensify the Livestock operations and appointed Sri K. S. Nair, G.B.V.C., M.R.C.V.S., D.T.v.M., for this new post.

Thus this vexed question of separation of Livestock section from the Veterinary Department has ended and we appeal to everyone to take this decision in good spirits and settle down to work.

A word to those who started to agitate over this question. Put the country before self. Any ryot in a village will today admit that Livestock work in Madras has made very good progress under the Veterinary Department. What does it matter who delivers the goods, so long as it is done faithfully and well? Let there be no squabbles over power and position. Think only of the man behind the plough. Let us not forget him in our attempt at self-aggrandisement.

Let everybody settle down to serious work then. The good work that has been in progress all along has been badly dislocated during the past twelve months. There was nothing but propaganda undermining the morale and discipline of the staff. This

should no more be permitted. We only hope that both the Director and the Government would insist upon substantial work and not countenance talk, talk and more talk.

To those who cannot pull the weight with a hard-working Department like the Civil Veterinary Department, Madras, the order of the day must be "Work or Quit". It is only then the good name of the Department will not be dragged into the mire.

FREEDOM!

(Contributed.)

"Freedom's battle once begun
Though baffled oft is ever won".

Freedom has dawned on India! It has been hailed in thousand and one ways throughout the length and breadth of the land. Be that as it may, "what next", is our problem now. It is not merely a problem to be discussed and solved only at high Ministerial level for the entire nation. It is as much a problem of the individual who composes that nation. It is this aspect of the question we wish to impress on the members of our profession. Let every son of India remember that he has to serve his country loyally and well in his own humble sphere of work to retain this freedom, so admirably won. How is this to be done? The tri-colour of our National Flag has been interpreted in many ways. But to us it must mean Sacrifice, Honesty, Efficiency. The wheel denotes motion and not immobility. Action and not inaction. Work and not idleness.

Yes; we have to sacrifice many things if we have to serve our country faithfully. It costs even to be good. Thousand and one handicaps thwart us to do well even the work of the present hour. Let us not despair of the steep climbing, the sore struggle and the hard knocks. Let us go to our work with a determination to put our profession in India on a par with other scientific professions of the world. No sacrifice should be considered too great to achieve this object. Remember, you are the

custodians of India's honour in your own walk of life. This is no empty platitude but a sacred object to be achieved, if India is to hold her head high in the comity of Nations. Purity in service can only be obtained if corruption is completely eschewed. Luckily our profession can claim to be free from this 'cancer'. But beware! Let it not be allowed to creep in! Our leaders are crying hoarse over this corruption. A corrupt nation digs its own grave. Are we going to allow ourselves to be the grave diggers of our beloved country? Corruption in small things leads to corruption in big things. The good name of India is in your hands and so let Honesty of a high order prevail amongst the Veterinarians.

The last of the Tri-colour should stand for efficiency. Sacrifice and Honesty alone cannot take us very far. To make everything green and fertile, efficiency with a capital "E" is needed. It is regrettable that some people merely mark time and do not exert themselves to rise to the standard required. India has no place for such men in the future. The profession must note down such men and deal with them ruthlessly. They must be exposed and society should no more countenance them.

If India is to be a power in the world, let us be disciplined through sacrifice; let us be pure in thought, word and deed and let us be thoroughly efficient through study and training and let us indulge in action and not in in-action. Let the eternal wheel of *Dharma* be ever before us reminding us of our duty to our motherland!

Wake up then those slumbering possibilities in you! Stir up those un-used inactive gifts that are in you and use them to the glory of India. That way lies our duty and let us do it to perfection. Jai Hind!

Clinical Articles

A RARE INJURY AT THE SCROTUM OF A BULL

By

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The subject was a Government H. Bull No. 856, aged about eight years, located at Muttra City.

The animal was reported to have been injured during a fight with one of the scrub bulls, the horn of the latter piercing through the scrotum of the former. As a result the penis of the bull was protruding out through the scrotal wound.

Examination revealed that the wound in the scrotum was inflamed suppurating and that it was infested with maggots. It was about $2\frac{1}{2}$ " long and had punctured right into the sheath through the scrotum. Evidently, the horn thrust was very severe and penetrating and the penis which must have been drawn well in during the fight, came out through the scrotal wound and got fixed there afterwards. The testes were fairly well intact. One of them was slightly injured while the other was normal and drawn upwards.

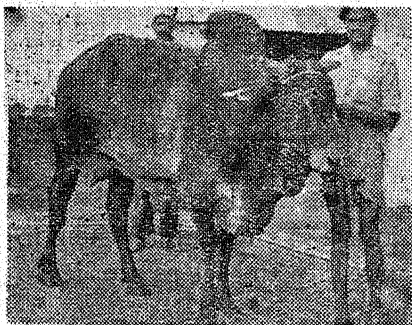


Fig. 1

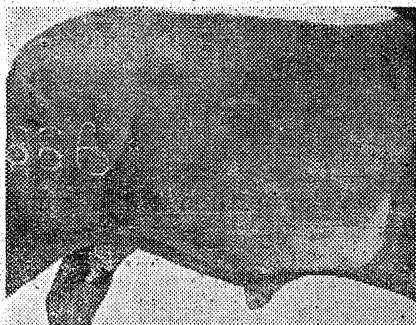


Fig. 2

There were no constitutional disturbances. The animal was eating and ruminating normally, and was passing urine freely through the protruded penis.

The wound was cleaned thoroughly, the maggots were removed and an attempt was made to put the penis back into its position, but it was impossible to reduce it owing to extensive inflammation and adhesions.

It was therefore left undisturbed, and the wound was fomented and treated antiseptically for a few days to get the inflammation down. On 4-2-47 a second attempt was made to bring the penis out through the normal opening but again it was a failure. The adhesions were very extensive, and completely immolitisied the penis in its present site. The attempt was therefore given up. The wound was treated in the normal way. It healed by the 15th March 1947, and the animal was discharged thereafter, as it suffered no apparent inconvenience from the abnormal position of the penis.

The enclosed two photographs giving two views of the case may be found interesting.

My thanks are due to Mr. M. R. Mahajan and Sardar Bahadur Sardar Udam Singh, Deputy Directors of the Department, for their kind interest and advice in this case.

A CASE OF ASCITES IN A BULL CALF COMPLICATED WITH RETENTION OF URINE

By

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Veterinary Assistant Surgeon, Draksharam.

Subject:—A local bred bull-calf, aged about one year in poor condition.

History and Symptoms:—The calf was admitted into the dispensary as an in-patient on 16-6-47 with the history that it was not passing urine since 8th June and that the abdominal cavity was getting fully distended. On examination, the visible mucous membrane were pale and the temperature was only 100.2°F. The animal was completely off-feed but was eating mud and drinking a great deal of water. The bowels were constipated. Examination per rectum revealed an empty bladder.

Diagnosis:—The case was diagnosed as one of Ascites. The following line of treatment was adopted.

16-6-47. A saline purgative was given.

17-6-47. No improvement. Tapped the abdomen and removed about two gallons of the fluid to relieve the distress. Hot soap water enema was given.

18-6-47. No improvement. The abdomen was again fully distended. The calf was unable to get up and the eye balls were sunken. The following draught was administered.

R/-

Ammon. Chloride	dr. II
Potas. Nitrates	dr. II
Methenamine	dr. I
Aqua	ounces IV

Mft. haust sig at once. A mild blister to the lumbar region was applied to stimulate the kidneys.

At 2 P.M. 20 c.c. of 40 per cent Hexamine solution was injected intravenously to induce diuresis.

19-6-47. No improvement was noticed. Tapped the abdomen again and removed two gollons of the fluid to relieve distress. The above draught was repeated with 2 drachms of Tr. Digitalis.

20-6-47. No improvement. The abdominal cavity was again fully distended. The calf was attempting to pass urine but it could not pass. Repeated the above draught.

21-6-47. 30 c.c. of 40 per cent Hexamine solution was injected intravenously. Tapped and removed two gallons of the fluid. By 3 P.M. in its efforts to pass urine, a few drops were found dribbling.

22-6-47. 7 A.M. The calf was found in a collapsing condition with the temperature sub-normal. Injected subcutaneously 3 c.c. of Liquor Adrenaline Hydrochloride in 10 c.c. of water. By 9 A.M. the animal stood up and passed about one ounce of urine in a stream and continued to pass urine at frequent intervals.

2 P.M. Two drachms of Calcium Gluconate in 40 c.c. aqua was injected intravenously.

5 P.M. The calf was found in great distress due to great abnormal distension. The abdomen was therefore again tapped and about two gallons of the fluid was removed. 20 c.c. of the sterile Ascites fluid was injected intramuscularly into the gluteal region.

23-6-47. To my great surprise, the calf was found eating grass eagerly and was passing urine freely. The abdomen had become pendulous.

The treatment thereafter consisted only of nourishing food and general tonics. The calf was discharged cured on 25-6-47.

SURRA—A NOTE ON ITS PREVALENCE IN EQUINES IN EAST GODAVARI DISTRICT DURING THE LAST FIVE YEARS

By

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District Veterinary Officer, East Godavari, Cocanada.

Incidence and distribution.—East Godavari District is one of the worst Districts in the Presidency affected with Surra. This District comprises twelve taluks, of which eight are upland areas mostly under dry cultivation and four taluks, deltaic tracts irrigated by canals. In the delta taluks of Amalapuram and Razole there are extensive cocoanut gardens. These taluks are situated between the two branches of the Godavari, Vasista and Gautami. They are cut away from the main land by the above rivers and they are bounded on the east by the sea. There are also extensive swampy areas bordering the coast in these taluks. Ramachandrapuram and Cocanada taluks are also delta areas but here cocoanut gardening is not extensive. The worst Surra affected taluks in the district are Amalapuram, Razole, Ramachandrapuram and Cocanada with 50, 126, 13, and 25 outbreak, reports respectively, during the past five years. Surra is found to occur in all the seasons of the year but its incidence is more during the fly season i.e., from July to September which is also the rainy season. The humid, warm and shady cocoanut gardens provide the best breeding areas for the flies and hence it is presumed that Surra is more prevalent in these areas. With the advent of motor traffic, jutkas have considerably declined in Cocanada and Ramachandrapuram taluks but in the island taluks of Amalapuram and Razole which are interspersed with many canals and branches of Godavari, motor traffic has not developed to the same extent as in the main land. Here people have to travel by jutkas from place to place. So the number of ponies in these taluks is more. The soil in these delta areas is alluvial. The ponies are maintained in a highly insanitary condition. Poverty and ignorance of the jutka-men mainly account for this.

Source.—It is generally believed that the bovines harbour the trypanosomes without showing any untoward symptoms and that they form the reservoir. During the period under report only 7 cases were confirmed for trypanosomiasis among bovines.

Symptoms.—As regards the symptoms exhibited, there is nothing peculiar. The usual history is that the pony was unable to perform the usual work and that the appetite was unsatisfactory. These are followed by a falling off in condition with oedema of the hind limbs and under the belly. On examination it is usually found that the temperature is up to 102°F, or even 104°F. Mucous membrane is icteric and petechiated with

running from both the eyes. At this stage when blood smears are examined, Trypanosomes are found to be present.

Treatment adopted is by intravenous injection of 10 per cent Antrypol solution. The first dose is 0.5 gramme per every hundred pound body weight and for the second and third injections half the above quantity.

During the year 1946-47, 64 cases were confirmed for this disease. Out of these, 4 ponies died before treatment, 3 during the course of treatment and 14, one or two months after the treatment was completed. Relapses were reported in two cases only and both of them died. The rest were reported to be alright.

Prevention :—Under the Glanders and Farcy Act all the reported cases were segregated and the usual sanitary measures were adopted regarding the cleaning and disposal of carcasses, etc.

If sufficient quantity of Antrypol is available it is hoped to cut short the incidence of the disease by giving all the ponies in the affected areas a monthly injection of Antrypol during the rainy season as a preventive measure. As the number of ponies are limited it may be possible to adopt the above method as is advocated in some of the journals.

PIROPLASMOSIS IN FOAL AT BIRTH*

By

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Senior Veterinary Research Officer, C.V.R.I., Kabete.

The following case is so unusual that it is considered worthy of record.

Two smears were submitted for diagnosis, one from a foal aged less than twelve hours and the other from the dam taken the day after foaling. The mare's smear had no parasites, whilst the foal showed intra-erythrocytic *Babesia cabali*. The parasites were numerous and large, having the characteristic pear shape with the majority arranged in pairs.

The history is best given in the words of the owner. "These slides were sent in by me. The mare (a Somali I had just bought) foaled some time early in the morning of April 2nd. Owing to the condition and colour of the foal's gums, I suspected biliary fever and sent the slide to our veterinary office right away. It was diagnosed as such and I accordingly gave the foal Pirevan injection forthwith, and sent the second smear, from the mare, the following morning; there could therefore have been no

possibility of the two slides having got mixed. The foal died within 24 hours of birth and in fact I did not expect it to live.

"As a matter of interest the mare had a horse-sickness inoculation about a week before foaling. I would say she carried the foal full time but it may possibly have been a week or ten days premature, certainly not more, if that".

The incubation period, judged from the time an equine is infected by a carrier tick and rise of temperature (with presence of numerous parasites in the blood) is usually 10 to 14 days but on rare occasions it may be as little as a week. It follows, therefore, that the foal must have been infected before birth. The fact that no parasites were seen in a thin smear of the mare's blood does not preclude her from being a carrier of *B. caballi* as having previously been native owned she probably had recovered naturally from an attack of biliary fever.

The conclusion that the infection was set up intra-uterine and that therefore the parasites must have crossed the foetal membrane barrier appears justified.

I acknowledge my appreciation to Mr. Cyril Norman, Stock Inspector, Kenya Veterinary Department, for having brought this case to my notice.

PENICILLIN THERAPY IN ACTINOMYCOSIS IN CATTLE*

BY

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Royal Veterinary College, Steyning.

Since June 1946, six cases of clinical actinomycosis involving upper and lower jaws have been treated with penicillin. The following examples are illustrative of the results obtained.

CASE 1: Six-year-old pedigree Shorthorn cow.

History and Appearance.—The whole of the left half of the lower jaw had been slowly enlarging for several months. At the time of examination two molars were displaced and mastication in general was difficult. The animal had begun to lose condition rapidly. Iodides had been tried but had merely slowed the pathological process.

Treatment.—One million units of penicillin in oil and wax suspension were injected with an all-metal syringe into eight sites evenly distributed over the enlarged area. A stout needle was easily pushed into the tissue but injection was difficult. This was continued as the needle was withdrawn; 500,000 units were given 24 hours later and a similar dose four days later.

†*Veterinary Record*, No. 34, Vol. 59.

Result.—As expected, this was not spectacular but in four months without further treatment, the jaw returned to normal size. The displaced teeth were extracted early in treatment and soft foods had to be provided over the same period.

CASE 2: Cross-bred red poll cow, seven years old!

History and Appearance —The right horizontal ramus had begun to enlarge over the previous two weeks. The swelling was hard and slightly tender on pressure but did not interfere with mastication. An aqueous solution of sodium penicillin was injected into three sites as above, 500,000 units in all being used. Two days later the swelling was smaller in size but the dose of penicillin was repeated. Without further treatment the enlargement disappeared in ten days and has not recurred after three months.

The other four cases developed along similar lines.

CONCLUSIONS

1. Solutions of penicillin are of value in the treatment of bovine actinomycosis when injected, early, into the actual lesion.
2. There is no advantage in the oily suspension over the aqueous solution which is easier to inject and diffuses more rapidly.
3. The injections must be disseminated as widely as possible.
4. In long-standing cases, results will be slow.
5. An all-metal or reinforced syringe must be used.

Association News

THE BOMBAY VETERINARY MEDICAL ASSOCIATION

*Proceedings of the Extraordinary Annual Conference, held on
8th, and 9th October 1947 at the Bombay
Veterinary College, Parel, Bombay.*

The Conference was held at 4 P.M. on 8th October 1947 in the Lower Anatomy Lecture Hall in the Veterinary Hospital Compound, Parel and many members and guests from the City including students of the College assembled in the hall punctually. The chief guest Rao Bahadur J. N. Mankar, (Secretary, Humanitarian League) arrived with Mr. P. A. Mhatre at 4 p.m. He was received by the President Dr. D. S. Laud and the Secretary, Mr. G. A. Hardikar and the members of the Managing Committee; the President introduced the chief guest to the Members of

the Managing Committee, the Principal and the College staff and was conducted to the dais in the hall amidst cheers.

Dr. M. Mohey Deen, Principal, Bombay Veterinary College delivered the welcome speech (*Appendix A*). Then followed the Secretary who first read out the names of those who had sent messages expressing good success to the conference and then placed the annual report before the conference (*Appendix B*). Among those who wished success to the conference mention may be made of the following:—

- (1) Rai Bahadur P. N. Nanda, Director of Animal Husbandry and Veterinary Science, B. P., Poona.
- (2) Dr. M. D. Vaishnav, Divisional Vety. Officer, Surat.
- (3) Dr. B. R. Phanse, Vety. Surgeon, Chota-Udaipur.
- (4) Khan Bahadur, A. H. Khan, Professor of Anatomy and Animal Husbandry, Vety. College, Hyderabad (Dn).
- (5) Dr. S. N. Luktuke, Imperial Vety. Research Inst.
- (6) Dr. L. N. Ghatpande, Vety. Surgeon, Sholapur.
- (7) Dr. N. H. Laxmeshwar, Vety. Surgeon. Ratnagiri.
- (8) Dr. A. A. Chate, Vety. Surgeon, Barsi.

Dr. D. S. Laud followed the Secretary and delivered his Presidential address (*Appendix C*) at the end of which the chief guest was garlanded by the President, and the Jt. Secretary Mr. M. R. Redkar garlanded the President amidst cheers from the members. Then Dr. D. S. Laud requested the chief guest to declare open the conference and amidst loud cheers he rose to address the conference. The Chief Guest Rao Bahadur J. N. Mankar addressed the gathering with his thought-provoking and illuminating speech (*Appendix D*) for about an hour in which he gave a piece of advice to the Veterinarians regarding the course they should adopt to get full justice from the Government and declared the conference open.

This was followed by a spontaneous and interesting speech by Mr. P. A. Mhatre (*Appendix E*) who showed a novel idea of getting the wrong redressed by democratic methods under a popular Government. Dr. R. N. Naik then thanked the Guests (*Appendix F*) and all those assembled and others who helped to make the conference a success. The days programme ended with singing of "Vande Mataram".

The following members of the Association attended the conference:—

Drs. 1. M. R. Tagare, 2. S. S. Patkar, 3. B. A. Devarukhker, 4. V. I. Patel, 5. I. I. Nagamiya, 6. V. B. Kharate, 7. N. S. Kolte, 8. B. G. Behare, 9. T. R. Khaladkar, 10. P. G. Date, 11. R. G. Sathe, 12. S. J. Khambeta, 13. G. A. Hardiker, 14. S. V. Modak, 15. N. G. Bhide, 16. S. R. Rao, 17. S. P. Deshpande, 18. M. N. Palekar, 19. P. R. Dhake, 20. C. W. Fernandez, 21. L. R. Patankar, 22. V. G. Revandekar, 23. N. G. Kulkarni, 24. P. Miranda, 25. D. R. Gokhale, 26. S. R. Nadgir, 27. K. V. Divekar, 28. R. H.

Naik, 29. V. M. Kotbagi, 30. S. G. Dixit, 31. M. K. Havaladar, 32. Gulam Mahomad, 33. R. M. Kalapesi, 34. B. G. Waghmare, 35. S. P. Phadke, 36. V. N. Vaishnav, 37. S. S. Naik, 38. S. R. Kulkarni, 39. L. S. Hiregoudar, 40. A. E. Kulkarni, 41. R. C. Khare, 42. M. B. Tilak, 43. P. H. Abhyankar, 44. Dr. D. R. Chavan, 45. B. T. Chitre, 46. T. P. Nabar, 47. K. R. Alur, 48. D. B. Khole, 49. K. R. S. Aiyar, 50. H. A. Chhaya, 51. S. G. Kshirsagar, 52. G. R. Kurkibhavi, 53. M. R. Redkar, 54. C. J. Fernandez, 55. G. G. Chebbi, 56. S. R. Chadha, 57. R. G. Dharwarkar, 58. Rao B. V. R. Phadke, 59. Dr. D. S. Laud, 60. G. H. Joshi, 61. K. S. N. D. Dhakmarwalla, 62. M. H. Nagamia, 63. R. R. Tavargiri, 64. S. B. Hanchlikar, 65. V. N. Navangul, 66. R. K. Raikar, 67. M. M. Murgod, 68. R. N. Naik, 69. M. Mohey Deen, 70. H. R. Chandrashekharaya, 71. F. S. Khambata, 72. S. M. Mehatha, 73. S. V. More, 74. D. H. Bendigeri, 75. M. S. Mehta, 76. Fernandiz Decruz, 77. S. Hattangadi, 78. T. G. Desai, 79. D. R. Mudholkar, 80. B. L. Purohit, 81. J. P. Damri, 82. J. H. Unarkar, 83. S. N. Gadag, 84. B. M. Phatarphod, 85. G. B. Shahane, 86. K. B. Nair.

9th October 1947.

The Subjects Committee formed on the previous night went through the following agenda at 10 A.M. and scrutinised it thoroughly.

Agenda.

1. A resolution to mourn the sad demise of Dr. B. B. Joshi, Dr. V. B. Mahabal and Miss. P. Davar.
2. G. R., R. D., No. 1088-III dated 2-5-1947 regarding (a) amalgamation of the Veterinary Department with Livestock and Dairy Development Sections and the Agricultural Department. (b) Abolition of the Veterinary Department.
3. Reorganisation of an independent Animal Husbandry and Veterinary Science Department for the Province.
4. Transfer of the Bombay Veterinary College to Poona.
5. Changing the designation of Veterinary Assistant Surgeon to Veterinary Surgeon.
6. Deputation of the Veterinary Graduates to Foreign Countries for higher studies.
7. Preferential treatment shown to Agricultural Graduates while selecting candidates for higher training abroad in Animal Husbandry.
8. Selection of personnel from outside source, possessing neither extra merit nor experience of the departmental working nor seniority.
9. Reconstruction plan for production of animals, dairy products, other animal foods to help the Province to meet the scarcity of food.

10. Regarding pay scales of the Veterinary Assistant Surgeons and the Municipal and S. P. C. A. staff.
11. Regarding preferential treatment to war-returned personnel.
12. Any other item that may be brought up with the permission of the Chair.
13. Election of office-bearers for the next year.
14. Reading of Professional papers.

The subject Committee discussed and adopted the following resolutions which were later placed before and passed by the General Body of the Association. Dr. D. S. Laud presided over the deliberations.

RESOLUTIONS

1. This Association learns with great regret the sad demise of two of its members namely B. B. Joshi and V. B. Mahabal and offers its heartfelt condolences, to and sympathises with the members of their families. This Association also regrets to learn the early and sad demise of Miss, P. Davar, the Vice-President of the Bombay S.P.C.A. and offers condolences to and sympathises with those bereaved.
2. This Association deplores the policy of Government as laid down in Government Resolution, No. 1088-III dated 2nd May 1947 in amalgamating the Veterinary Department with the Livestock and Dairy Sections of the Agricultural Department and recommends that the Dairy and Livestock Sections should be amalgamated to the Veterinary Department with regard to the policy and administration under the complete control of the Director of Animal Husbandry and Veterinary Science and it further recommends that the designation of the Livestock Expert to the Government of Bombay be changed to that of Cattle Development Officer on the analogy of the Dairy Development and Poultry Development Officer. Further the Association recommends that the Director of Animal Husbandry and Veterinary Science should be directly responsible to Government and that under no circumstances this post should be held by any person other than a Veterinarian.
3. This Association resents the decision of the Government to transfer the Bombay Veterinary College to Poona without assigning any reasons notwithstanding the repeated appeals and representations made by this Association, and requests the Government again to reconsider and reverse the decision.
4. It is resolved that the present designation of the Veterinary Assistant Surgeon be changed to that of Veterinary Officer on the same lines as the Medical Officer in charge of dispensaries with a view to providing them with a status and position in public.
5. This Association has observed that step-motherly treatment is being meted out to Veterinary Graduates when deputing Officers for higher training abroad in Animal Husbandry and allied subjects. In spite of the fact that certain Veterinary Graduates that have been selected for training abroad are held back while fresh agricultural graduates have been selected and are being sent. The Association strongly deprecates this policy and recommends that justice should be done to the Veterinary Graduates in this matter.
6. This Association views with disfavour the policy adopted for recruitment to Gazetted posts, ignoring the claims of the people already in service.
7. It was resolved that the attention of the Government should be invited to the previous correspondence regarding the pay scales, distinction between old and new graduates and fixing the old graduates into new scales without jeopardising their

seniority. Further resolved to invite the attention of the Bombay Corporation and the S. P. C. A. authorities in respect of this.

8. It was resolved to continue the representation to Government deploring the policy of preferential treatment to war-retained candidates.

9. It was resolved that a Veterinary Officer should be in charge of salvage of dry cattle instead of Agricultural Graduate and dairy diploma holders in the interest of efficiency and request the Government to consider this impartially.

10. Resolved that the Director and the Government should be reminded to expedite the question of registration of Veterinary Surgeon's act which is still under Government consideration.

11. In view of paucity of Veterinary Assistant Surgeons in the subordinate Veterinary establishment this Association recommends to Government that re-employment may be given to retired persons in the subordinate cadre alone as a purely temporary measure, without affecting seniority and selection grades, their remuneration being equal to the substantive pay at the time of their retirement.

Election of Office-bearers for 1947 October onwards.

Dr. D. S. Laud	...	<i>President..</i>
„ T. R. Khaladkar	...	<i>Treasurer</i>
„ S. G. Kshirsagar	...	<i>Secretary.</i>
„ M. R. Redkar	...	<i>Jt. Secretary.</i>
1. Dr. G. H. Joshi	} <i>Members.</i>	Dr. R. G. Sathe } <i>Auditors.</i> „ P. G. Date }
2. „ R. R. Tavargiri		
3. „ S. G. Dixit		
4. „ S. B. Hanchlikar		
5. „ R. N. Naik		

Besides this, the Association decided to approach the Director, the Government and other public bodies as the case may be, in respect of the following:—

(a) To consider about permanent travelling allowance to Veterinary Assistant Surgeons.

(b) To consider about providing quarters on the premises of every dispensary and hospital to the Veterinary Assistant Surgeon to increase the efficiency and usefulness of the institutions.

(c) Regarding recommending to pay house rent at the rate of 15% of the pay taking into consideration the present conditions.

(d) Regarding paying Rs. 30/- per month to the Veterinary Assistant Surgeon who holds the charge and supervises the work of another dispensary in charge of a stockman.

(e) To consider the question of discouraging the programme of keeping the stockmen in charge of dispensaries.

(f) Regarding radio talks on Veterinary and Animal Husbandry subjects to be given by Veterinarians only.

(g) Regarding holding of certain posts in the Bombay Municipality by non-veterinarians.

(h) Requesting the Bombay Municipality to send their own scholars to the Bombay Veterinary College to meet their requirements,

The following professional papers, for want of time were taken as read :—

- | | |
|--|-------------------------|
| 1. Mastitis in cattle. | } By Dr. R. N. Naik. |
| 2. A preliminary study into
Corynebacterium Pyogenes
infection in animals. | |
| 3. Feeding of cattle during
famine. | |
| | By Dr. F. S. Khambatta. |

The Secretary, Dr. G. A. Hardiker, then thanked the Principal, Dr. M. Mohey Deen for having given all facilities to make the conference a success.

Dr. R. N. Naik thanked the Chairman, Dr. D. S. Laud, the Secretaries and the Managing Committee for making the function a grand success and thanked all the Members who attended the Conference to make it a success. Thus the Conference ended with "Vande Mataram Song".

G. A. HARDIKER,
Hon. Secretary,
Bombay Veterinary Medical Association.

APPENDIX A

Welcome speech by the Principal, DR. M. MOHEY DEEN
President, Chief Guest and Professional brothers,

It gives me very great pleasure to welcome Rao Bahadur Mankar, who has kindly consented to grace the function to-day. He is known by his activities, in connection with the work of the Humanitarian League, of which he is the Secretary. His association with us and our college is from very long time and he has readily attended many functions of our Association before. He has addressed the students of our college and only a few days before, he accompanied the members of the "Peace Mission" in their visit to the Hospital.

His love for animals is unprecedented and he is a ready help to them in suffering. His sphere of humanitarian work extends all over India, but the Province of Bombay which is notorious for famines, claims his special affection. When the Districts of Ahmednagar and Bijapur were ravaged by famine, he was the first to organise relief for the suffering cattle. Food and

fodder were diverted to these districts from surplus district and even free kitchens were provided for the needy people. His work in this connection with Thakkar Baapa ever remains appreciated particularly by the Agriculturists, public and Government alike. He was rightly called the saviour of dumb animals. His work particularly in connection with salvage of cattle and concentration camps is admirable.

Gentlemen, Rao Bahadur Mankar needs no further introduction since he is known to all in the veterinary profession. We are fortunate in having him this evening as our Chief Guest since he is the person who knows the aspirations and ideals of the veterinary profession and has given often free expression on the needs of the province in respect of welfare of cattle.

Gentlemen, I do not wish to stand long between you and the Chief Guest. I thank him once again for the ready consent, and the honour he has done to the association and to the profession in consenting to open the Annual Session.

Thanking you all.

APPENDIX B

SECRETARY'S REPORT

After thanking the members for their attendance, the Secretary presented the following report of the Association for the period from June 46 uptodate.

This association was founded in the year 1921 when it was known as "Bombay Veterinary Graduates Association" and the membership was only open to graduates of the Bombay Veterinary College. In the year 1929, by resolution No. 3, the association permitted the graduates of the other recognised Veterinary Colleges to become members with a view to create a better union among the members of the profession and to widen the scope for constructive work. Later on, in the year 1931, the name of the association was changed to Bombay Veterinary Medical Association to give it a more specific and definite identity.

This is the first time in Free India that our association is holding its conference and like the whole nation which has passed through the state of transition with some gain and some loss, we also have done the same with some success and some failure, hoping other for a brighter future under the constitution of a Free India, a greater opportunity for the association to fulfil its objects.

This association had many difficulties at every stage of its progress but today I am glad to say that it has survived all the blasts of adversity and has maintained its identity and usefulness. All the credit goes to the members of the association who have unselfishly helped it to come to this stage. The

association is also much indebted to the advice and encouragement given from time to time by enlightened and distinguished gentlemen of high position. In this connection I should say that I would be failing in my duty if I do not mention a few names of those who were gracious enough to open the conferences and give an encouraging lead to the activities of this association. The association is specially grateful to the following gentlemen.

1. Major Williamson, Animal Husbandry Commissioner to Government of India.
2. Sir Gulam Hussein Hidayatulla, Ex-Minister.
3. Honourable Mr. Murarji Desai, Ex-Minister.
4. Major E. S. Farbrother, Director of Veterinary Services, Bombay.
5. Sir H. F. Knight, Adviser to Government of Bombay.
6. E. W. Perry, Reconstruction Commissioner to Government of Bombay.
7. M. J. Desai, Secretary, Revenue Department.

This year we are specially fortunate in getting Rao Bahadur J. N. Manker, the Secretary of the Humanitarian League, who does not need any introduction particularly to the veterinary world. He is the person who has given the greatest expression to the sufferings of the dumb creatures and I may say that he may rightly be called the "Saviour of dumb creatures" and this is the first time we have a distinguished free man in a free country to open the conferences. The members will agree with me when I say that the choice has fallen on the right person and we are sure our road to achieve our objectives will come nearer, and nearer. The association will ever remain grateful to Khan Saheb Dhakmarvala, Rao Bahadur V. R. Phadke and Dr. D. S. Laud for the yeoman service they have rendered to the association as successive Presidents of the association.

In spite of the 'delayed' notice of this 'delayed' Annual Conference which could not be held last December due to political and communal upheaval in the country, I am glad to note that the members have now assembled in large numbers and have really decided to make it a perfect success.

After the last Annual Conference, during the period under report, the managing committee met six times, though ordinarily they meet only twice in a year in normal times. It was necessary to meet often, at times even at short intervals, as the interest of the department, profession, education and above all the interest of the members who are the backbone of the whole structure were rudely shaken.

The following few are the most important of our activities.

According to Resolution No. 2 of the last annual conference a deputation consisting of D. S. Laud, S. R. Chadha and the Secretary waited on the Municipal Commissioner, Bombay, regarding the revision of scales of pay of the Veterinary Surgeons employed under the Bombay Municipal Corporation. He

assured that all possible steps would be taken for the revision of scales. The association also suggested different grades of pay for different sections and the Municipal Commissioner has officially informed us that the revision of grades is under consideration of the standing committee.

According to Resolutions Nos. 3 and 4, the authorities were approached to stop the policy of granting extension and re-employment to some posts, of retired men and I am glad to say that authorities have started respecting the legitimate demand of the members.

In its Resolution No. 5 it was resolved that the facilities for higher education and specialised training abroad be given to members of veterinary profession in equality with those of the sister departments, in schemes of Post War Reconstruction. The authorities were twice approached with regard to this Resolution but I regret to say that the authorities do not appear to have taken encouraging steps though they may be intending to do so many a time.

According to Resolutions Nos. 6 and 7 the question of revision of grade, distinction between old and new Graduates, disparity and invidious distinction in pay were repeatedly taken up and a deputation consisting of Rao Bahadur V. R. Phadke and Dr. S. R. Chadha waited on the Director of Veterinary Services and convinced him about the injustice. The association later on, during the course, decided to wait on the Honourable Minister but the association was informed by the Government, through the Director, that the Government had revised the scales as recently as November 1945, that further revision of scales of pay will be considered along with the general question of revision of pay scales of all the Government servants which was under active consideration of Government and that under the circumstances, Government do not consider it necessary to grant an interview. This is in short the present position with regard to pay scales etc. The association has of course submitted the lines on which the pay scales should be fixed and the grievances of the old Graduates should be redressed.

In Resolution No. 9 the question of celebrating the Diamond Jubilee of the College was taken up and it was later decided by the College authorities that the college staff and the students should celebrate the same with the co-operation of the association and the past Graduates: hence no further action needed.

According to Resolution No. 10 passed on 3rd December 1946 by the managing committee, the authorities were repeatedly requested in the form of memorials and letters to protect the interests of competent senior persons and not to give any preferential treatment and benefits to higher posts, particularly to the Gazetted posts, for war-returned personnel and had suggested 'double' promotion and treating the war period as 'double service' as benefits to the candidates. In this connection the Government have recently asked the association to point out instances of preferential treatment to war returned persons.

During the period under report, when the association learnt that the Government was actively considering the question of shifting the Veterinary College to Poona, the matter was taken up and a deputation consisting of Khan Saheb Dhakmarvala, Dr. D. S. Laud and the Secretary waited on the Honourable Minister in-charge of our portfolio who gave a patient hearing and assured the deputationists of his sympathetic consideration along with the other cabinet members before taking a decision. The Honourable Minister had further assured that the question would be discussed with the President and the members of the association at the time of his visit to the Veterinary College but the promise was not fulfilled for reasons best known to the authorities. This matter was very actively taken up and I regret to say that the Government have recently informed the association that the matter of shifting has been finally decided.

According to Resolution No. 2 passed by the managing body on 9-7-1947 on the strength of the Government Resolution No. 1038/III of 2nd May 1947, the Government was approached to clear the points noted below.

- (a) Whether the Veterinary Department is to be abolished.
- (b) Whether the Veterinary Department is to be amalgamated to Live-stock section or vice versa.
- (c) Why the designation of the present head of the department is Director of Animal Husbandry and Veterinary Science, if Veterinary Department is to be abolished.
- (d) Whether the head of the Veterinary Department or any senior member of it, and also well wishers of the profession, were consulted in determining the policy.

Besides requesting the Government to enlighten on the foregoing points, the association has humbly suggested that an independent Veterinary and Animal Husbandry department may be organised with all its branches directly responsible to the Director who should be responsible to the Government directly. The reply in this connection is not yet received from the Government.

In addition to these most important and vital subjects, the association during the period under report passed many other Resolutions and suitable actions were taken in all the cases. It will thus be seen that the association was all along very active in safeguarding the interests of the Veterinary Profession which will be seen from the volume of work turned out which is a record in the history of the association. Besides, I am glad to say that the association never failed to keep in touch with the activities of the sister associations in the other Provinces. The association desires to associate itself with all the ambitious activities of the Humanitarian League under the able guidance of Rao Bahadur J. N. Mankar, chief guest of this evening and I am sure he will be very glad to hear this. We all know that the Humanitarian League have in the past

acknowledged and have been acknowledging the services of the Veterinary Profession in the famine areas and salvage of dry cattle. The association is sure that the able guidance of the chief guest of this evening would help us to solve many of our naughty problems confronting the Veterinary Profession in the country and particularly our Province.

Coming to the strength of the association, I am glad to say that the association has this year 194 members as against 176 last year and enlisted 18 new members and 6 life members as against 6 and 2 last year. I thank all those who have contributed to the strength of the association, but I am sorry to say that there are still heavy arrears inspite of appeals which will be read out to-morrow as a piece of information.

I thank the President and the managing committee and all the members in general for having given me the opportunity, for serving the association and request them to excuse me if there are any shortcomings during the time, I am particularly thankful to my colleague and co-worker Mr. M. R. Redkar, the Joint Secretary for his active help.

Gentlemen, I thank you all once again for all the co-operation and encouragement you have given to me to make my task for the year a success.

G. A. HARDIKAR,
Hon. Secretary.

APPENDIX C

Presidential Address by DR. D. S. LAUD, G.B.V.C., F.Z.S., (LONDON).

Mr. President, Gentlemen, my professional brothers and students,

It gives me great pleasure to extend a most cordial and hearty welcome to you all on behalf of the Members of the Bombay Veterinary Medical Association, to an extraordinary Annual Conference, which is being held to-day. We generally hold the annual conference every year in the month of December. Accordingly we should have convened the conference in the month of December last. But, we had agreed that our annual conference should synchronise with the Diamond Jubilee of the Bombay Veterinary College, which should have been celebrated by the College authorities, who have undertaken this task, in the month of December last. We had also decided to invite the All India Veterinary Conference on that happy occasion just in the same manner as we celebrated the Golden Jubilee of the College in the year 1936, when the Bombay Veterinary Medical Association undertook the task and I was then the Honorary Treasurer. The result was that we were able to collect over Rs. 5,000 to celebrate that happy function which we did so well. I am very much pleased to state

that the response from our graduates and patrons at the time was spontaneous and liberal. However, since the Jubilee Celebrations of the College have been postponed *sine die*, we thought that it was now time to hold at least an unusual annual conference. Hence we are now meeting hurriedly at this extraordinary annual conference.

At the last two Annual Conferences of our Association (1944 and 1945) we had two very distinguished guests viz., Mr. E. W. Berry C.I.E., I.C.S., the then Reconstruction Commissioner to the Government of Bombay to preside over our sessions in 1944, and Mr. M. J. Desai, B.A., LL.B., I.C.S., C.I.E., the then Secretary of the Revenue Department to preside over our conference in 1945. Both of them were Government Officials. But to-day we have in our midst a distinguished non-official as our chief guest, Rao Bahadur J. N. Mankar, who is the Secretary of the Bombay Humanitarian League.

Dr. Mohey Deen, the Principal of the Bombay Veterinary College has already introduced our chief guest of this evening in his welcome speech. I fully associate with him in what all he has said, and I need not say more. But suffice it to mention that I have known Rao Bahadur for a very long time since my graduation from this College and during the very long period of my service of 35 years in Bombay Municipality. As the Secretary of the Bombay Humanitarian League, Rao Bahadur is very well acquainted with our ideals and problems.

It is needless for me to go into the details of the activities of our Association. Mr. Hardikar, our enthusiastic Secretary has fully narrated in his brief report the work done. However, I would like to state that we have made a very satisfactory progress in our membership during the year and also in all other activities.

Now let me give you a brief history of our *Alma Mater*. Our College was established in 1886 as a premier Veterinary Institution in India with very high ambitions by the late Mr. John Henry Steel, F.R.C.V.S., who was then the first Principal of this Premier College in this Premier City of India. If the ambitions of Mr. Steel had been fully realised our College would by now have been on equal footing with the Grant Medical College, and our Veterinary Services would have seen better days. But unfortunately as the destiny ordained, these high ideals of Mr. Steel did not materialise for reasons best known to the officials, who then held sway and power. In the year 1936, Matriculation was made compulsory for admission to the College, and from 1940, the standard for admission was raised to that of Inter-Science "B" Medical Group with three years course with advanced curriculum. Thereafter our College came to be affiliated in 1945 to the Bombay University with a Degree of B Sc, in Veterinary Science and the curriculum has been extended to four years after Inter Science. This is

the third year since the affiliation and in this connection our sincere thanks are due to the University Commission that made a favourable report, particularly to those gentlemen who helped us towards our goal viz., Dr. B. N. Uppal, Rao Bahadur D. L. Sahasrabudhe and Dr. Erulkar, and last but not the least Mr. Chadha who was then the Principal, of the College. But for his enthusiasm and quick action, we would probably have lingered and the affiliation of the College to the University would not have been a *fait accompli*, as is the case now.

But while we achieved this goal, we now have very distressing news and that is about the venue of Veterinary Education being shifted from Bombay to Poona. In this connection we made a representation to the Honourable Minister in charge of the Veterinary Department on the 18th September 1946, submitting the following against the proposed transfer :—

(1) According to certain arrangements existing between the Government and the Bombay Society for the Prevention of Cruelty to Animals, the Bai Sakarbai Dinshaw Petit Hospital for Animals, has been appointed as an Infirmary under the Act. As such this Institution affords ample clinical facilities to the students of the College in different branches of Veterinary Services. Those facilities could not be expected any where in the mofussil, let alone in Poona.

(2) In the retention of the College in Bombay there are other very important points, which should also be taken into consideration.

(a) The Bombay City and Harbour Veterinary Department, the enforcement of the Glanders and Farcy Act, the Bombay Zoo, the Markets and Slaughter Houses, the Pinjrapoles and the Gowshalas provide great material and ample facilities for the study of Epizootic and other animal diseases in Bombay.

(b) Facilities for practical demonstration of milk, meat and food inspection and their preservation under refrigeration exist in abundance at the Milch Cattle Stables, Markets, Slaughter Houses, Dairies and Refrigeration Plants in the City. Besides according to the Government plan, the Dry Cattle Farming Scheme and the milk Supply Scheme afford ample educative opportunities.

(c) Existence of the Goat Virus Producing Depot in the College and the location of the office and Laboratory of the Veterinary Investigation Officer Bombay Province in the College premises also provide facilities for practical educative opportunities.

(d) Clinical facilities provided for the students are unrivalled in Bombay, because a very large number of horses, cattle, dogs,

birds, poultry, sheep, goats and pigs are demonstrated to the students at the Bai Sakarbai Dinshaw Petit Hospital for Animals which is the best and most elaborate Society for the Prevention of Cruelty to Animals in India.

- (e) Veterinary Colleges are located in presidency towns in other Provinces for the ample facilities which these cities afford in point of scientific and clinical research. Besides the natural contact which is so necessary for moulding the character of students is unrivalled in Bombay.
- (f) Several well-equipped medical and other scientific educational institutions and above all the famous Haffkine Institute and the Tata Cancer Research Institute, which are in very close proximity of the College not only provide necessary academic and scientific atmosphere, but numerous opportunities for establishing useful contacts so necessary between the Veterinary and Medical professions.
- (g) Government in affiliating the College to the Bombay University appear to have taken into consideration all the clinical, scientific and research facilities necessary for the purpose, which are already existing in the college and the hospital. As the Bombay University has affiliated the College with regard to the present conditions and situation, the opinion of the Bombay University will be necessary.
- (h) The importance of the College will be further enhanced if Government would see their way to establish a depot for the preparation for Sera for the human beings and for animals. These sera for the human beings in India are mainly prepared by the Bengal Immunity Company who are reported to be so full that they cannot cope with the demand. This work could be profitably started if the Government would be pleased to establish a depot with certain number of horses and other animals in the compound of the college and the Lazaretto, where facilities already exist for establishing them and carrying out this work with the assistance of an expert. Since it is learnt that the Government is shortly to open a Serum Depot in the Province, it will facilitate the work if it is located in Bombay or Bombay Suburban District as the sister institution like the Haffkine Institute.
- (i) On account of the proposed scheme for Greater Bombay there will be ample opportunities, rural as well as urban and further if the proposal of Government to establish a very big dairy centre at Palghar or in the alternative in the suburban area of the

Greater Bombay Scheme, it will afford ample opportunities in Bombay itself.

- (j) Taking the above facts into consideration, my Committee beg to enlist their strong but respectful protest against the idea of proposed shifting of the College to Poona, and on the other hand suggest shifting the office of the Director of Veterinary Services, Bombay Province, to Bombay. just as the case of the Surgeon General to the Government of Bombay on point of administrative efficiency and closed co-ordination between the department and the Institution. I may add here that in the past Government proposed to abolish the Veterinary College and at another time proposed to shift the College to Poona. We had then lodged respectful protests against these proposals and Government considered our arguments with unbiassed mind and decided to retain the college in Bombay City.

After submitting the above representation, myself along with Khan Saheb N. D. Dhakamarwala and Mr. Hardiker, our Secretary waited upon the Honourable Minister Mr. M. P. Patil in the Secretariat on 15th November 1946 and discussed the matter thoroughly with him, when Sir Evan Jenkins, the then Secretary to the Reconstruction Department and Agricultural Commissioner was present at this interview. At the discussion the Minister of Agriculture gave us to understand that there was the proposal of the Government to transfer the College to Poona on account of its rural atmosphere and that facilities existed there for Animal Husbandry which was not the case in Bombay and further he gave us to understand that one of our own Graduates whose name I do not wish to disclose, had also advised him for a transfer. When questioned whether the Bombay University had been consulted, the reply was in the negative. We were also assured that the Bombay Veterinary Medical Association would be consulted before a final decision was taken, but nothing was done. If Government feel that the want of a rural atmosphere in Bombay and the need of facilities for the study of Animal Husbandry, I fail to understand why Poona alone should be selected and not any other place like Ahmedabad, Nadiad, or Anand in Gujerat, for as you all well know Gujrat is the Garden of Bombay Province, Gujrat possesses the finest breed of Kankrej Cattle in this Province, there is a Government Cattle Breeding Farm at Chharodi, and above all Anand is a big Dairy-centre. But all these factors may now be ruled out of consideration in view of the fact that there is the development of Greater Bombay in progress. Government have acquired the village of ARE in Andheri in the Bombay Suburban District for milch cattle and development of Dairies in this very large area, while the salvage of dry cattle scheme will be located at Palghar nearer Bombay. Here I may quote an extract from the note on the Nutrition work in progress in the

Bombay Province in the year 1946. Under his No. 2204 dated 9th November 1946, the Nutrition Officer to Government, Dr. Dadachanji writes as follows:—

"A big Dairy Scheme for modern dairy farmers in the suburbs of Bombay at a place called ARE (Mean Andheri) is almost nearing completion. The model dairy farm will possibly have other private dairies built round it so as to convert ARE into a further model town for the City of Bombay and its suburbs. Ultimately it is hoped that all the stables from the City and suburbs will be moved to this centre under Government instructions and supervision".

I am given to understand that this scheme has already been taken up and it will take not long for completion. When such is the case and when one of the Ministers of Government viz., Mr. Dinkarao Desai, the Honourable Minister of Civil Supplies has already this very big and important scheme up his sleeves, which will provide ample facilities for the study of Animal Husbandry in the rural areas, in close proximity to Bombay, why another Minister of the same Government that is the Minister for Agriculture and Veterinary should feel the necessity of transfer of the College to Poona simply on the grounds of want of facility for Animal Husbandry and so on. Is it not preposterous to launch into a scheme, which will cost lakhs of rupees at this stage which the Government can ill afford to spend on the purchase of land, construction of college buildings, hostels, laboratories, hospitals and the construction of the infirmary for animals suffering from infectious diseases and above all their equipments and so on at the transfer of college to Poona? On the other hand will it not be wise policy at this stage to develop the present institution, rather than spend such large amounts, which is to my mind, could be best spent and which are principally needed for problems like the development and increase of Food Production and cloth, which are at present the vital needs of the country and above all to meet the very great problem of rehabilitation of the large number of refugees, who arrived and are still arriving in this City and the Province from Sindh and the Punjab? When we again wrote to the Minister for an appointment, we received a reply from Government dated 25th August 1947 that it is finally decided to shift the college from Bombay to Poona. Surely it is not possible for us to fathom the mind of the Government inspite of the great ordeals which Government has to face in the present difficult circumstances.

Our chief guest of the evening Rao Bahadur Mankar, as the Secretary of the Bombay Humanitarian League and who is so well conversant with our ideals and problems, will agree with me and endorse my views. My humble suggestion is that the successor as the President and the new members of the Managing Committee, who will shortly assume office of the management of the Bombay Veterinary Medical Association,

may take up this question again with Government and if necessary appeal to the Central Government and agitate in the press.

The burning question of the day is about the cow slaughter and protection of the sacred cow from the knife of the butcher. Since this question was first mooted by Seth Dalmia, several views both for and against the slaughter of cows have appeared in the press, and the supporters against cow slaughter have now demanded for legislation, prohibiting the slaughter. But of all the views that have appeared in the public press, I shall commend to you the view of that Great Man of India, the apostle of truth and non-violence, I mean Mahatma Gandhi, who has written a very fine article under the caption "How to serve the Cow" in the weekly "Harijan" of 31st August 1947, the extract of which appeared in the Times of India of 9th September 1947. While dealing at length with the several problems in connection with his articles, on the question of how to serve the cow, I shall give you the summary of Mahatma Gandhi's views here :—

(1) By the Hindus performing their duty towards the cow and her progeny. If they did so our cattle would be the pride of India and of the world. The contrary is the case to-day.

(2) By learning the science of cattle breeding, to day there is perfect anarchy in this work.

(3) By replacing the present cruel method of castration by the humane method practiced in the West.

(4) By thorough reform of the Pinjrapoles of India, which are to-day, as a rule, managed ignorantly and without any plan by men, who do not know their work.

(5) When these primary things are done it will be found that the Muslims will of their own accord recognize the necessity, if only for the sake of their Hindu brethren of not slaughtering cattle for beef or otherwise. The reader will observe that behind the foregoing requirements lies one thing and that is "Ahimsa", otherwise known as Universal compassion. If that supreme thing is realized, everything becomes easy. When there is Ahimsa there is infinite patience, inner calmness discrimination, self-sacrifice and true knowledge. Cow protection is not an easy thing. Much money is wasted on its name. Nevertheless in the absence of "Ahimsa", the Hindus have become destroyers instead of survivors of the cow. It is even more difficult to note the average quantity of milk that the cow in India yields is said to be roughly 2 lbs. per day, that of New Zealand is 15 lbs., of Holland 20 lbs. The index figure for healthy cows give up in proportion to the rise in milk yield. From the above one will realize how things stand at present and the way of improvements are necessary to be effected.

From my personal experience of 8 years as Superintendent of the Municipal Markets and Slaughter Houses in Bombay, I may state that the animals slaughtered at the Bandra Slaughter House come to Bombay from long distances. Freshly calved young buffalo cows are imported from Punjab, milked in Bombay for about 10 to 14 months until dry, and then sold to the butcher for slaughter. The best buffaloes in India are thus killed in their prime, while it may be noted that the large part of all milk supply nearly 80 to 90 per cent is buffalo milk. It may also be noted that the Municipality has levied a very high fee of Rs. 15/- per head for slaughter of a buffalo, simply with a view of discouraging the slaughter of these fine buffaloes. This is the highest fee so far known for slaughter. The cows and buffaloes are mostly of the small Deccani trotting type and come here from Poona and Sholapur Districts by train to Kurla. Thus you will observe that the type of cows and bullocks that are presented for slaughter at the slaughter houses in Bandra are of the scrappy kind and are unfit for dual purposes i. e. as milch and draught cattle. No animals are fed especially for the market, as is the case in foreign countries. The only really good grazing for the animals is during and immediately after the monsoon. The beef supply in Bombay is inferior as the weight of dressed meat of an Indian cow average about 250 lbs, as compared with, say, 700 lbs. in Australia, New Zealand, England etc. If such is the case, the question naturally crops up as to what should be done with such a type of scrappy cattle, and whether it would be economically worth while to conserve them.

While on the subject of the conservation of useful cattle from slaughter, I would like to give you an insight into the "Proposals for restriction of Meat Consumption" when as an Assistant Controller in charge of Civil Supplies Godowns of Government in Bombay. I was asked by Sir Henry Knight, the then Adviser to the Governor and who was in charge of the Civil Supply Department to express my views on them. The scheme was proposed by government. In this scheme it was proposed that Meat Ration cards should be issued to consumers and establishments on application against their agreeing to the surrender of 1 lb. of cereal food grains for every one lb. of meat ration given to them. I submitted a very comprehensive report on 19-10-1944 pointing out among other things that this exchange will be of a complicated nature in view of the fact that the consumption of cereal is far more important to allow the equivalent for the like quantity of meat as the latter will contain bones etc. and whether such a proposal will be beneficial from a nutritive point of view as a well balanced diet, rich in vitamin contents. It will be for the Nutrition Committee to work out this ratio. Further it will have to be borne in mind that the percentage of regular meat consumers, casual customers and establishments will have to be determined and ratio fixed accordingly. I do not wish to go into the whole length of this report but I suggested that instead of rationing

the meat, which involve a lot of expenditure for staff etc., apart from its complications, it will be more economical to have one meatless day in a week and follow the footsteps of Calcutta where there were two meatless days while within the municipal limits and the Cantonment of Karachi, the then Government of Sindh had introduced one meatless day in a week with effect from 7th October 1944. Further such a meatless day would not prove any hardship as there is the natural tendency amongst the majority of communities to observe one day in week as a vegetarian diet day on religious grounds which again is based on hygienic principles.

But in the meantime Government had already imposed the necessary restrictions under the Defence of India Rules under G. R. No. 9257 dated 12th June 1944 to the following effect against slaughter of :—

- (1) Bulls and bullocks physically fit and below the age of 10 years and suitable for work.
- (2) Cows in milk and cows in calf.
- (3) Young stock of the above suitable for breeding purposes.

However, under the above order provision was made, where these restrictions did not apply to the acquisitions in slaughter of such animals for a bonafide religious purpose.

Similarly under G. R. No. 9257/24 (a) dated the 12th June 1944, Government restricted the number of buffaloes to be slaughtered in Bandra, Bombay Suburban District, Kurla, Ahmedabad, and Malegaon in Nasik District. Further restrictions have also been imposed in giving quota to the butchers with a license to slaughter only certain number of cattle. There is also dual inspection of these animals both by the Government and Municipal Veterinary Officials at the ante-mortem examination at Bandra Slaughter house.

Rao Bahadur Phadke always had a thrust at me about the slaughter house at Bandra. Yes! we admit that the slaughter house at Bandra is very old and has become obsolete. It was built about the year 1866—1867 or so to meet the requirements of the population at that time. Capt. Flanders who was my immediate predecessor and a Vet from the Veterinary School at Toronto, Canada, very much desired to take up the improvements of our slaughter houses but from one cause or other and in view of the financial stringency, the matter was deferred although the Municipality had secured land for shifting the slaughter house from Bandra to Deonar near Chembur. When I succeeded Capt. Flanders in 1936, I immediately took up the question of improvement of the slaughter house and re-modelling the refrigeration plant at the Crawford Market knowing fully well the opposition which the meat traders of the market and slaughter house would have against the shifting of the slaughter house to Deonar. I had put up

two alternate proposals during the time of Mr. M. D. Bhat, M.A., J.P., I.C.S., the then Municipal Commissioner.

- (a) for shifting the Slaughter House to Deonar (original proposal) at an estimated cost of Rs. 29,46,735 and;
- (b) for remodelling the present slaughter house on the most modern and sanitary lines and fitted up with upto date equipment at an estimated cost of Rs. 8,49,030.

But before these proposals could finally be put up before the Municipal Corporation, the second World War broke out and the proposals had therefore to be kept in abeyance. However, before my retirement on the 29th July 1944, I had proposed the improvement of the slaughter house along with the markets in the Municipal Post War Reconstruction Scheme for which the heads of the different municipal departments were asked to formulate their proposals. I am given to understand that this question of the slaughter house is being taken up by the Municipal authorities. However, I would suggest that the Committee which will be shortly in office may take up this matter with the Municipal authorities if they so desire.

We have made considerable headway in improving the Veterinary education and the status of the Veterinary Graduates by the affiliation of the college to the University. But with regard to the prospects of the Graduates in Veterinary Science, it is very much regretted that nothing has been done by Government in this direction. There is, therefore, a necessity of not only increasing the scales of pay but also of prospect as well, for unlike other services, the Veterinary service is a specialized service, and one has to look for betterment of condition in the Veterinary Department only. The want of attention to this factor has already been reflected in the number of admissions to the Bombay Veterinary College, notwithstanding so much advertisement about free studentship, increase in the number and value of scholarships and other concessions. It is, therefore, but natural that a student before joining the college asks about the prospects the services can offer. It is very much regretted to remark that the scale of pay is in no way tempting, neither are the future prospects and promotions, as compared with those of other departments of the Government. The result is that neither the Government nor the Local Bodies are able to secure sufficient number of Veterinary graduates to fill the vacancies. In these hard days when the cost of living has increased it is for Government to see that the men in their service are adequately paid and are contented and happy. I would humbly submit for the consideration of our popular Government that the scale of pay of the Veterinary Assistant Surgeon may be fixed at the minimum of Rs. 150-5-200-10-300 and the Divisional Veterinary Officers in the Gazetted scale of Rs. 300-20-500-30-650.

I think our Graduates with all their training of four years in the college deserve this scale and what is more we shall be able to get up suitable candidates to join the profession. I therefore appeal to the popular government to consider the case in the light of the circumstances mentioned above. If government improve the lot of these servants, surely other sister services like the Municipality, S. P. C. A., Pinjrapoles and states will follow suit.

There is also considerable heart burning amongst the Veterinary Assistant Surgeons, whose seniority is not being recognised by making invidious distinction by recommending the defence service retrenched Veterinarins to higher posts. If this is done, the question naturally arises with regard to those Vets who were refused permission by Mr. E. S. Farbrother M.R.C.V.S., I.V.S., the then Director of Veterinary Services, Bombay Province, either for the sake of civil administration of the department or simply because they were not eligible to join the defence services on account of age limits. Similarly to my mind there should be no distinction made between the Veterinary Graduate in the department and have experience to their credit with the length of service in the department with the inexperienced recruits who have passed with the new curriculum, for after all experience and length of service must count. However, if the prospects are brightened and the grades are revised on the lines mentioned above, I think there will be no discontentment. As Mr. M. J. Desai, I.C.S., in his Presidential address on 28th December 1945 pointed out to us that it is always upto us to make the Secretaries understand the necessity of our demands. The senior officers, who guide the department should apprise the Secretary with full details. The proposals that we make should not be dictatorial in terms of so much staff required for a particular scheme, but should be explanatory as to the amount of benefit it would accrue to the country by saving lives of cattle and its utility to the public health.

With regard to the preventable disease of livestock, it is necessary to provide an upto date and well equipped laboratory and a serum institute not only for imparting instructions to the students but for manufacturing sera and other biological products for supplying the needs of our province. We are glad to note that this has been sanctioned.

In the light of the present knowledge for elimination of that great scourge in cattle viz., Rinderpest, Goat virus and sera vaccinations are the only remedies. We have now a central goat virus depot at the Bombay Veterinary College and further two more sub-depots have been opened and are functioning at Jalgaon and Dharwar. This is very satisfactory with the result that much work is being done towards preventive work and the immunization scheme is taken up.

It is now high time that District Veterinary Dispensaries should be provided with a microscope, for immediate diagnosis. At present the material is sent from the mofussil to the Bombay Veterinary College for diagnosis, and it takes about a week or so for the results to be known: this is obviously unsatisfactory. I am given to understand that this is under consideration of Government.

It is also necessary to have a post-graduate course instituted in our college in Bacteriology, Pathology and Hygiene including food inspection and Municipal Veterinary public health. For instance, we may have a degree in Bachelor of Veterinary Hygiene, just like the B. Hy. in Medicine, now that our college is affiliated to the University. There are enough facilities for such a course in Bombay with the large Municipal markets, slaughter house, dairies, cattle stables, refrigeration and ice plants in the city. Food inspection should not only be confined to Meat and Milk, but also should be extended to the inspection of milch cattle byres dairies fish, poultry, eggs, fruits, vegetables, refrigeration and preservation and provision stores, a vast range of field for training in public health.

We have often stressed the necessity of registration of the Veterinary Graduates. In this connection, I would again request the Director of Veterinary Services to take up the subject and not wait for all India Registration.

I do not wish to try your patience any longer. However, I crave your indulgence for allowing me a few minutes for doing my duty of thanking all those who have rendered me all their help and co-operation in carrying out the work of the Association, especially the members of the Managing Committee for their whole hearted support. I am also thankful to the guests for their kind presence this evening.

In conclusion, I have to thank again our chief guest of this evening, Rao Bahadur J. N. Mankar for very kindly accepting our invitation and spare his valuable time to preside over our function. I shall now request him to declare our conference open.

APPENDIX D

Speech delivered by the chief guest, RAO BAHADUR J. N. MANKAR,
Secretary, Humanitarian League, Bombay.

Doctor Laud and Friends,

I am much grateful to you for the honour you have done to me by inviting me as Chief Guest at the Extraordinary Annual Conference of the Bombay Veterinary Medical Association. I am surprised, however, how

your partiality of regard for me has made you to forget that you have chosen a layman for a conference of technical people. You should not be surprised, therefore, if you feel disappointed in not getting any assistance from me in your deliberations of technical matters for which you will have only to thank yourselves. I may be excused for having to differ from what has been said about me. But I am, of course, proud to feel that I am one of you in trying to serve the dumb friends and ameliorate their condition, physical and economical, and claim to be your professional brother though not technically as a Veterinary Surgeon. This feeling is responsible in inducing me to accept your invitation and while now in your midst I can safely bank on it and your indulgence, in tolerating shortcomings.

My connections and regard for my professional brothers, the Veterinarians is as old as my efforts for the service of the dumb. I have had ample opportunities to see them serving their constituency very faithfully in the face of immense odds and inequities which they are obliged to suffer, and suffer mutely, perhaps because their work lies among those who cannot speak and plead for their saviours except by mute blessings; but certainly under those who are perhaps the loudest, in ventilating the slightest injustice or discomfort and asserting their rights at any cost, I mean the custodians of administration and national welfare.

My contact with the department though begun with a fight for securing prompt measures for control of epidemics like Rinderpest and other diseases in the time of your Ex-Director, Dr. Farbrother, has since then been developed into a spirit of complete mutual co-operation and regard and has given me ample opportunities to know more of the scientific methods of saving and serving animals along with sentimental methods, to which I am pledged. I have almost been convinced that science and sentiment seldom differ in essence, provided they are considerably applied with a sense of service and sincerity. To me science seems to have emanated from sentiment, having the same humanitarian objects in view, but differing only in methods of application and I firmly believe that one without the other cannot really save the dumb animals.

During my long contact with the department and its staff I have found many of my friends sitting here as active missionaries always anxious to serve and save the dumb animals though labouring under departmental and pecuniary inequities and I am happy to say that the departmental heads have always extended full co-operation for animal welfare work done by public bodies and workers during normal and abnormal times. I may assure them that though their noble efforts and conscientious discharge of their duties may not have achieved anything substantial financially for them their services and sacrifices for a cause which is highly national and

humanitarian have achieved much for the country and have only made their case stronger, which can now demand immediate appreciation from the representatives of the people's Government, who have won the much-needed independence for our country, mainly to right the wrongs done during past centuries during foreign domination. I remind you that the strength of the struggle for independence lay only in the selfless services and sacrifices based on non-violent methods, preached and practised to this day by the Great Apostle of Ahimsa and the Father of the Nation "Mahatma Gandhi". Since such selfless services and sacrifices for the country's cause succeeded in throwing off foreign domination, there is no reason why your noble services and sacrifices for a similar noble cause of saving dumb animals should not succeed, in righting the wrongs especially by those in charge of the national Government now, whose sole aim is to restore justice to man and animals inhabiting the country.

I may also remind you that sanctity of animal life is one of the divine heritages of mankind which entitles him to hold a higher place in the creation of God. India, from time immemorial, recognised this sanctity of animal life and made it a cardinal principle of its religion. This sanctity of life translated into action by proper care and treatment of animals and thus saving them from ill-treatment, as you have been doing through the application of your science, justifies rationalism and humanity, as is borne out by the words of Ruskin that "Don't fancy that you will lower yourselves by sympathising with the lower creatures; you cannot sympathise with the higher unless you do with these". True civilization and humanity is, therefore, measured in terms of sympathy, love and mercy shown by mankind to all creatures, especially the lower ones and animal welfare workers are therefore the custodians and active missionaries of civilisation and humanity

It is, therefore, no wonder that the cow—the symbol of Indian civilisation and humanity should figure marvellously in the history of the country through her performance in the pre-historic and pre-Vedic times. As the nebular conditions of the land settled and the civilisation dawned over the horizon of the land, quite naturally it simultaneously dawned over the mental horizons of religious seers. These formulators of religion or civilisation got a vision of the immense potentialities and mighty possibilities of the cow and defined cow and brahmini-bull, just as the cow and the bull of highest performance from scientific points of view are considered as mother and father of the herds.

India, the glory of the Globe was then literally a land of milk and honey. Sweet nectar like fountains of milk played perennial and profuse throughout the length and breadth of the country. The Nation was hale and hearty, pure and powerful. As observed by Dr, A. A. MacDonell

"to no other animal has mankind owed so much and the debt so richly repaid with a veneration unknown in other lands. So important a factor has the cow proved in Indian life and thought that an exhaustive account of her influence from the earliest times of the World would form a note-worthy chapter in the history of civilisation. But to-day the cow though yet an object of veneration, has ceased to be a fountain of milk due to various reasons known to you and me principal among which is want of care, food and adequate Veterinary aid. It has been rightly observed by Sir William Wedderburn "what country in the World has ever flourished which has neglected its cattle. We (British) boast ourselves as trustees of India, but what have we done to preserve cattle, absolutely nothing". But fortunately those days have gone and with the national Government in power, it should be and is their foremost concern to discharge their duty as trustees for the welfare of the country and humanity.

It hardly needs any mention that India is a land of distances and a land of villages subsisting on agriculture. Agriculture connotes draft especially in India where the use of mechanical power for agriculture is not suitable. Beast is superior to man in point of draft. The bullock is found most suitable to the purpose and climate and the female could be tapped for her milk. The animals whose males yielded food from fields and the females yielded luscious lactoproducs and whose fluid and solid excreta yielded fertility to the land, must naturally bear the palm. The cow thus became India's Kamdhenu and uncrowned queen of the land. It fed the land with the manure, the land fed the plant, the plant fed the man and the animal, and the man in his turn fed and cared for the animal. It is thus a cycle of Tapa, Bhoga, and Yagna, cast into motion and we have to keep these cycles into eternal motion for peace, plenty and prosperity. Even the modern civilisation of the World which is at its highest zenith in the West and especially in America owes very much to the cow. But for the cow their materialistic grandeur should be half shorn off inspite of the vast paraphernalia of their colossal means, money, munitions and machinery. Cow directly builds the Nation by sumptuous dishes of Lactoproducs for which no nation, no materialism has yet been able to devise any suitable substitute without serious detriment to national health and efficiency.

Thus cattle in general and cow in particular humanises mankind. Cow in a sense serves as barometer of country's cultural and economic level and is a sure indicator of mankind's moral and material progress. Cow and man form a link, both at a time, to swim or sink. They rise or fall together.

In eulogy of the cow as the foundation of national prosperity, you may perhaps think that I missed this function as a cow conference, but I mention this merely to impress upon you that you veterinarians are the highest benefactors of the nation and the country in as much as you have accepted

it to serve and save the cow as your profession. If cow has to live, she can live and prosper only with the help of veterinarians and their applied science. Charities cannot save them for all the times; it is their performance kept up by their being in health and free from diseases which not only can save them but preserve their dignity and divinity which has to-day only been proverbial and it is here that veterinary science and the votaries are concerned.

Reviewing the present position, it should be admitted that the treatment meted out even to the most useful animals is positively and deliberately cruel. The horse which is still the most useful animal is the worst sufferer. Cattle are subject to no small illusage even in the lands of the Hindus. Cattle are wretchedly thrashed and half-starved. Even the cows are uncared for and ill-fed. They have deteriorated in quality. In the past cow used to feed the man while to-day perhaps she eats the man. There is callous indifference on the part of the people and the State. Millions of cattle die every year of preventible diseases and many more are dragged to the slaughter houses. The home and professional industry of animal breeding is fast decaying. There is widespread paucity of milch and agricultural cattle. Those that are available are leaving a life of semi-starvation exposed to many diseases and exploitation of man. Death rate among cattle is abnormally increasing. Agriculture and production of food suffers for want of quality cattle. Hardly a spoonful of milk per capita is available out of the present milch cattle. Country is faced with a grave food shortage, starvation, disease and premature deaths. Hence this problem of Animal Husbandry and care and treatment of animals has become acute.

To-day after destruction of national and natural resources following up the last world war, reconstruction programme is being launched in the country including our Province. Let the Government realise, and I am sure they do, that no schemes of development of Agriculture and health of the people can succeed without planning to preserve and improve the cattle by launching generous schemes to reconstruct the Animal Husbandry, protect them from diseases and exploit all potentialities in the best interest of the nation.

As a member of the Imperial Council of Agricultural Research and once the member of the Provincial Rural Development Board, I have painfully observed that the subject of Animal Husbandry and Veterinary Science is not given the importance and the attention it deserves. The schemes sanctioned in the Reconstruction plans for the Province of Bombay are disappointing. Though the need for reorganisation and expansion of the Animal Husbandry and Veterinary Department is accepted and overdue steps proposed these are half-hearted and partial. It is false economy

to spare anything when country needs to grow more food, and for reason of that, protect and develop its cattle by all possible means.

From what I know of the department, its institutions and field staff I am constrained to observe that there is very little to the credit of the present Ministry so far, as reorganisation and development is concerned. Even the recommendations of the Linlithgow Commission and the Imperial Council of Agricultural Research have not been fully acted upon. I feel that this is evidently due to the fact that Animal Husbandry Department is treated as a branch of the Agricultural Department, in our Province. As a matter of fact animal breeding, husbandry, dairying, Veterinary medicine and Surgery are inseparable part of one branch of national development and should be fostered as such. Animal life being a higher form of evolution dominates over plant life for subsistence under laws of nature. Animal science is not only, not more useful and complex, than agricultural science but has built up a noble profession which is held high in the public estimation. Besides Animal Husbandry and Veterinary Science being an applied one occupies a superior position in the sphere of biological science and in rendering services to the development of a nation and agricultural country and as such has undisputed rights to develop quite independently. I wonder how the important fact has escaped the notice of our Ministers who have accepted the need of independent department even of fisheries under a Minister. If fisheries whose economic value even if developed is negligible and whose use is sectional when compared to the huge value of livestock and its earnings and its supreme and universal importance for development of agriculture and building up of a healthy nation, can be an independent portfolio under a special Minister. Animal husbandry—Veterinary Science should be an independent major portfolio under a Special Minister. The present Government should survey the progress and consider the past experience of the step-motherly treatment given to this branch by the past Government and instead of treading the same faulty beaten track, centralise this important branch under a special Minister of Animal Husbandry and Veterinary Science. In matters of such scientific departments I believe the Government should not feel shy to act upon the considered view of the Imperial Council of Agricultural Research and Royal Commission on Agriculture and other recognised Veterinary Associations, and do justice to this important branch of national development. I note from the reports of the Association and speech of the President that our Government have recently brought Animal Husbandry and Veterinary Science under one Director for which they deserve congratulations. But I hope your conference will arrive at the above conclusion and firmly approach the Government with a request for developing this branch as an independent portfolio under a special Minister so that it may have greater opportunities of serving the animals and the country. When this is achieved there should be no difficulty in expanding and developing the educative and research side as

well as application, of the science for treatment, control of diseases and results of researches to larger number of animals. To-day I find in our province that there are no adequate number of dispensaries. It is only recently proposed to abolish dual control of dispensaries and start one dispensary at least in each Taluka under 5 year plan. I wonder why the Government have not planned to take over the control of all dispensaries from local bodies at a stretch.

I believe, Government should immediately take over the control of all the dispensaries and abolish dual system in the first year of the plan with a view to bring about efficiency and uniformity of administration.

I find from the reports that there are about 970,000 cattle and about 42,00,000 sheep and goats and 5,00,000 camels and horses and the number of Veterinary Assistant Surgeons is hardly about 170 with about 154 dispensaries. It has not been possible to start dispensaries in all the Talukas and Petas not to say anything about the villages or groups of villages. Thus the Veterinary aid being given by the Government at present is negligible. Even according to the recommendation of the Royal Commission on Agriculture, made 20 years ago, there should be one Veterinary Dispensary for every 25,000 cattle though from efficiency point of view, this proportion is also very low. Yet taking it as a basis of expansion, there should be at least 540 Veterinary Assistant Surgeons in our Province. In view of this the schemes proposed by the Government in the Reconstruction Plans fall much too short even of the minimum requirements of the Province. Apart from this, the question of control of diseases calls for most urgent attention of the Government. As is well known the incidence of death due to epidemics is very great in our Province. Thousands of best useful milch and agricultural cattle are being swept away from year to year and the cultivators and the public are put to a loss of millions of rupees. Growing of food and supply of milk are seriously affected. It is the paramount duty of the state to save so many useful lives from premature deaths and to save the people from shortage of food consequent upon the loss of cattle. Luckily Veterinary Science has advanced to an extent to be able to save the animals from epidemics if adequate staff and protective vaccines and sera as well as medicines are available. It is false economy to spare money in providing for these at a stretch. Half hearted measures in this respect, not only will not succeed in stamping out epidemics but money spent in such half-hearted measures as well as in the development of animal husbandry will also be wasted. The position of cattle in the country at this juncture is critical. Country cannot afford to lose a single animal even if the present production of food is to be maintained. For growing more food as planned by Government many more quality cattle are essential. I draw the attention of the Government that dilatory and half-hearted measures will only accentuate the situation with regard to cattle in the Province and if they really intend

to do any national good of a lasting nature, it is now, and now alone, that they should provide for adequate protection to the existing cattle.

Government should not forget that the income derived from and with the help of cattle is greater than any other source of revenue. Out of the total earnings of India from all sources estimated at about Rs. 2,200 millions, income from and with the help of cattle alone amount to about Rs. 2,200 million rupees. In fact it is the cattle alone that support the Government and the people, It is, therefore, wrong for any Government, and the more so for National Government, to economise in providing means of protection and development of this important industry.

We are surprised how poor is the contribution of the state for the welfare of the cattle through veterinary departments in the country say about Rs. 54,29000 which hardly comes to four annas and pies six per 1000 cattle per year when compared to the princely amounts spent by other countries for protection and development of cattle and milk supply. For example during 8 years from 1932 to 1939 Britain spent about 40 crores of rupees to keep up their cattle and dairy industry as a means to supply protective food to the nation, while the same Government here destructively exploited the cattle of our country and left us in a precarious condition. Let the National Government immediately by paying maximum attention and making generous grants for developing the department of Animal Husbandry and Veterinary Science as a major branch under one Minister save the cattle and the people from threatened breakdown. Apart from providing more dispensaries and larger number of stockmen under each dispensary the question of special officer and special staff for control of diseases such as Rinderpest, Tick and other parasitic diseases, Surra, Ranikhet and diseases among Dairy cattle and Disease Investigation officers with adequate number of Research Institutions in the Province, demands priority. No improvement in cattle is possible or should be undertaken before weeding out all diseases that kill them at any stage of improvement. I hope Government will be implicitly guided by the advice of the Director of Animal Husbandry and Veterinary Science and your Association which is the authoritative public opinion in this respect and sanction all measures suggested by them at a stretch instead of planning them as a long range plan.

Whenever the question of development or expansion of such technical branches is raised, Government is in the habit of evading on the ground that technical graduates are not available. I am not prepared to accept such an evasive excuse especially because Government themselves can prepare more graduates by starting more colleges and even by starting short term courses as a temporary measure. For example if one more College for Veterinary Graduates is started immediately our need for additional graduates can be supplied soon. But here too the usual reply of

the Government in the past was that students do not join the college in sufficient number. With this reply or presumption the duty of the national Government should not end. They should enquire into the causes that keep off the young men from joining the college and immediately remedy them. Apart from the question of aptitude for a particular branch of science and profession, the decisive factor in the selection of a line in life for an ambitious young man is the pecuniary side of it. The Grades offered in the past to the Veterinary Graduates were beggarly and the revised grades at present are still lower and inequitable in as much as an invidious distinction between old course and new course graduates is made. Though the requirements for admission and period of study in case of B. Sc., Veterinary are by on means lower than Bachelors in other branches of science; they have meagre chances of promotions and postings to higher posts and have no chance at all for additional earnings from professional practice. Their constituencies are poor and their patients are dumb and unruly and averse to treatment. They have larger area to look after with no assistants, no conveyance and are faced with immense difficulties and dangers of their profession. They have to thrust themselves on their constituency and make them treatment minded. They have no official status in rural officialism. Yet they have to work hard at the sacrifice of their comforts and comforts of their family very frequently in foreign areas. They are obliged to neglect the education of their children as their place is necessarily in Taluka towns and villages where there are no institutions for higher education and they have no savings to defray the heavy expenses of education in cities. Thus professionally, socially, officially and financially, a Veterinarian has a sad tale of sacrifice and disappointment. While facing all this and meekly putting in full course of services, he reaches a maximum of about Rs. 170/- or Rs. 175/- after perhaps 20 years of hard life and then he has no further chances as there are very few higher posts in the department and for whatever there are men from outside the Province or war returned people are directly recruited, dealing a death blow to the departmental career of experienced men of the department. Unless all these disabilities are removed, Veterinary Colleges can never attract students. Government should seriously consider these disabilities and inequities between Graduates and Graduates, and raise the start and grades of Veterinary Surgeons to Rs. 150 to Rs. 250/- grant special allowances for conveyance and education of their children and decide to give higher posts only to the men in the department with approved services.

Such measures alone can induce young men to follow this noble profession with contentment and turn out more efficient work. As I have observed above, anything spent on this department will more than compensate for, by saving millions of rupees worth of cattle and useful lives which, in turn, will serve mankind by labour, milk, manure, hides and what

not. I whole heartedly support the plea raised by Dr. Laud and your Association and wish that you should persistently put up your case to the Ministers and not rest content until your legitimate grievances are redressed. I have no doubt, our Ministers are well meaning and sympathetic. The very fact that they are our representatives is reassuring. They will do justice by removing this long standing cause of discontent and make the education and application of this humanitarian science, a matter of attraction to the young men of the country.

From the agenda of the Conference and the speech of Dr. Laud I find that the Government has already taken decision to transfer the College from Bombay to Poona in face of cogent reasons for keeping the college in Bombay. I do not understand whether this decision of Government is based on any grounds of development, financial or increasing the efficiency and utility of the institution. On the face of it, it seems absurd to remove fully equipped progressive college having other clinical, social and educational amenities patent to Bombay alone, to Poona where Government will have to spend huge amounts for providing buildings and expanding the hospital. Supposing the Government will do all that though not justified to do, how can the full fledged popular Sakarbai Hospital having all special of Indoor and Outdoor patients or the like of it can be created at Poona and how can 60,000 dairy cattle of Bombay be found in organised groups in close proximity for clinical purposes and study in Poona? Again the geographical importance and social as well as educational importance of Bombay is in itself a reason why the Bombay Veterinary College the only one of its kind not only in Bombay but in India should not be removed. Students from Gujrat, Kathiawar and other Provinces will find it very inconvenient to go to Poona which is already congested so far as educational institutions are concerned. If the Government thinks that Maharastra can independently support another college so far as students are concerned, they can certainly start a new college! The Government should reconsider their decision and instead decide to start one more college in the Province to produce more graduates. They should also consult the Indian Council of Agricultural Research and the Bombay University to which the college is recently affiliated.

I join in the protest raised by you on this issue not only as your friend but also as a public worker and friend of the dumb cattle.

Apart from the question of starting another college in our Province, I also believe that with a view to make Veterinary Science popular and useful among the masses, Government should start short course classes for preparing Stockmen and for giving elementary education to the sons of cultivators, cattle owners and others interested in the science, keeping admissions open to Vernacular Final students. I would also suggest that the Revenue Patils in villages must be trained to be able to render first

aid to cattle in their respective villages. Lessons on general information about common diseases of cattle and precautionary measures and first aid, should be introduced in the text books for schools in rural areas.

With regard to post-graduate training and training for special subjects both in our country and abroad preference should always be given to deserving senior members in the staff of Veterinary Department as it will give impetus to more efficient work. The policy of selecting agricultural graduates for higher studies in Veterinary and Animal Husbandry Science is suicidal for Veterinary Department and should not be followed.

I believe there are many such problems connected with the conduct of development and expansion of the Animal Husbandry and Veterinary Science Department, on which Government holds different views from the experts. With a view to consider all these questions in details and arrive at impartial conclusions, beneficial to the whole nation and its development, the Government should appoint a Committee including representatives of Animal Husbandry and Veterinary Science Department and your Association and some public Institutions like the Bombay Humanitarian League to go into all these details and recommend to the Government, ways and means to remove disabilities and secure immediate developments including starting of new research institutions in the Province for subjects like Animal Nutrition, Artificial Insemination and Diseases among Dairy Cattle.

Having advocated your case and that of your patients the dumb creatures so far as the Government is concerned, I also admit that the lack of appreciation of your noble endeavours on the part of the people is unpardonable. I charge these people and societies like Goshalas and Pinjrapoles, who never avail of your valuable help for treatment of their domestic animals, with wilful cruelty to their dumb friends whom they exploit and yet allow them to be tortured under agencies of diseases. Such people and societies are unfit for keeping animals. This kind of neglect and indifference is no less responsible for premature deaths and deterioration of our dumb friends. Society for the Prevention of cruelty to animals and humanitarian societies should see that this sort of callousness does not go unpunished. They must compel such owners to make their animals receive regular treatment and see that the animals do not suffer. More than 10 crores of rupees are annually spent by animal infirmaries and Goshalas on sentimental methods of saving animals. If they only spend a tenth of this huge sum in giving treatment to animals without which even the best animals die, they can utilise the young veterinarians and remunerate them generously.

To you young men, I have to give my highest compliments for serving the dumb animals at great personal discomfort and inconvenience and with least compensation. You have done your part gloriously. We have won

the struggle for Swarajya which demanded sacrifices from all quarters. Let yours be a valuable contribution in the field of service, so neglected and yet of the highest national importance. Every good act is bound to be rewarded and appreciated by a just and national Government. Without any lucrative motive continue to do your noble work and justice is yours. You have my full sympathies in solution of your problems. As servant of the dumb I am bound to make a common cause with you.

Never think that you serve animals for service sake. Every human being owes them a duty and obligation. Through the service of animals we serve our-selves and God.

Mere utility and scientific points of view will not help us or will not keep up your enthusiasm. Remember that no animal in our country is useless or a burden. If they appear to be so now, we are responsible for it. We should save them, serve them and improve them. We still need more animals, but better animals. Until we can breed better animals, we have to pull on with whatever we have. If we proceed destructively the whole rural economic arrangements will tumble and the country will starve.

Along with scientific methods of saving animals by proper feeding and protection from diseases, we have got to save them from slaughter-houses. The present legislative restrictions are deceptive and leave room for fraud. Government will have to stop slaughter of cattle if they care to save the nation. Until this is achieved you have an opportunity to save maximum of cattle by rejecting them from slaughter even under the present legislation. Do your part honestly with considerations of humanity and national outlook and earn the blessing of the Dumb and the people.

I congratulate the President and Members of your Association for useful work done by you in—asserting the rights of the profession and professional brothers and also in the development of the science and the Department. It is through such organised associations and their firm fight that you will be able to get your wrongs righted. Be loyal to it and make it stronger to voice your grievances.

I am glad that your Association has decided to work in co-operation with public institutions like the Bombay Humanitarian League. You can rely on its co-operation for all endeavours to save and serve the cattle.

Thanking you once again for the honour you have done to me by inviting me as your chief guest and for the patience and tolerance with which you have heard me, I declare the Conference open and leave you to consider the important agenda which is before the Conference and to take considerate and firm decisions to enhance the interests of the dumb cattle by application of your noble science through contented Veterinarians.

APPENDIX E

Speech delivered by P. A. MHATRE.

Mr. President, Dr. Rao and my young and old friends,

When Rao Bahadur Mankar asked me to speak, I would not have liked to speak to you as I had no desire of inflicting one more speech upon you, but I take this opportunity for my own selfish gains. I have met many of you individually but I never had an occasion to meet all of you together in such a grand gathering. I could not have had an occasion to meet the younger friends who are just launching on their self sacrificing profession. Having met you now I take this opportunity of thanking you all for the help that you have rendered to us many a time to treat all our cattle without any compensation whatsoever. Yours is a grand profession. An ordinary medical practitioner, however, inadequately he may be paid, can always look forward to the thanks that his patient gives, to the gratefulness that patient's relations express when the patient recovers from the illness that assails him. In your case you neither receive thanks of your patients nor are you in a position to get the benefit of the praise from grateful relations. In these days you are actually paid much less than a labourer is paid. Not that, I despise the labour or value the labour less when it is made with brain, but I do think that the labour follows the plan put forward by brain and that a brain worker is worth his meed, and he should be paid adequately to keep him in comfort and to allow him to pass his old age with ease. That is what he deserves. Therefore when I heard your Secretary and also your Chairman complaining about the pittance with which you are paid in Government service, my heart went out to you. You have many disadvantages with which to struggle. The distances that you have to travel to meet your patients and to treat them are enormous. The places where you have to stay in order to be easily available to the dumb creatures are generally far away from the society of men. With all these shortcomings and disadvantages you have nobly struggled and the old amongst you that enthused the younger to take up the practice of this selfless devotion to the cause of dumb creatures, deserve thanks. On behalf of all the institutions which require your help and on behalf of all the dumb animals who come within the chain of your practice, I thank you all.

The other matter which came to my knowledge while I sat here listening to the lucid and the eloquent reports of your Chairman and Secretary was that the Government intended to transfer your College from Bombay to Poona. In this matter a thought occurred to me. Has there ever been a transfer of a noted educational institution from one city to another anywhere else? I thought myself what would happen if Government of England for instance were to think of transferring the Cambridge and Oxford Universities from their present site to an admittedly better populated and more magnificent town of London. Would people sit quiet and listen to such a

proposal? Would the learned who have passed through the portals of these great ancient institutions allow the institutions to be transferred from their hoary and hallowed place to one that is new? I thought, is there really an instance of this nature anywhere in the world where noted seat of learning is transferred from one place to other? Then why should this institution of veterinary knowledge respected throughout India serving not only the Province but many other parts and States by turning out selfless workers and friends to dumb creatures, having its history going back to last sixty years, provided with all the facilities and equipment necessary to conduct the institution of this type, being in the midst of one of the greatest cities in India or probably the greatest city if we take into account the present influx of number of refugees in our midst, having all the facilities of number of breeds of milch cattle, variety of horses and other animals, and also having in our midst a well equipped and well kept zoo which shelters a fauna of all climes, situated next to one of the biggest veterinary hospitals in the Presidency, having been so fortunate so as to be in the Communication centre of the whole of India, having a climate which is all the year round equable and pleasant, be transferred from its present site to Poona, where admittedly there is not a good veterinary hospital, nor variety of animal population, nor the facilities of transport and communication, nor are the equipment and supplies so easily available. Instead why not allow it to remain where it is? Nor is this the only thing that came to my thought while I sat amongst you. I said supposing this institution were really transferred to Poona, was it possible that it can be developed into a first class institution? Was it possible to transfer all its facilities and comforts to that institution in Poona? Was it possible to do it as cheaply as it was possible to modernise this self-same institution with but a trifle of expenditure? I compute that at the minimum the transfer of such an institution would cost the Government not less than Rs. 50,00,000/-. It may cost the Government more and it will not give to the students a fraction of the facilities of study and observation and the comforts that Bombay Institution is giving and is likely to give if preserved and modernised. When I thought of Government spending this huge sum in days when such huge sum can be utilised for more productive purpose than satisfying the whims of an Officer or launching on a programme of an improvement by breaking and destroying all that is old and trying to rebuild on ashes of the old Institution another institution emulating the magnificence and surely the fate of Fatehpur Sikri. I said to myself is this wise? After all when Government itself undertakes to spend such huge sums whose money do they spend? I say, my friends, the money spent by the Government so lavishly are your own moneys or the moneys of the tax-payers and herein lies your hope, that if the Government is so quick to spend moneys of the tax-payers on fruitless tasks, the tax-payers should have something to say in this matter. In these days of democracy, it would not be difficult for you to carry your appeal from the obdurate Government to the people and ask them to help you in this struggle of rights against the wrongs. How this can be done can

be understood by looking to what happened or what was happening to another institution in this city. The Government that was at that time working for the avowed good of the people, decided, as you my friends know, to close the Bombay Arts School. This school, which they proposed to close, had served not only the Province of Bombay loyally but had made a landmark throughout the whole of India, by fine pieces of art and extraordinary skill that they brought to bear upon their work. Even the murals now in the Council Hall of the Central Legislature have been painted by School of Arts students. It would not take you long to find out the evidence of their work in beautifying and ennobling the town and island of Bombay. You have to look to fine carvings on buildings like Victoria Terminus, Bombay Municipality and many other fine buildings which the city boasts and which would not have been beautiful monuments of art unless the Bombay Arts School students had poured all that they know in moulding its beauty and chisling its lines. This matter of closing the Arts School was taken up by Arts Students who agitated and obtained public support the result was that ultimately the Government had to revoke their decision to close the Arts School and that Arts School is still here in this city amongst you in your midst. I can well understand that some of you older friends who are enmeshed in the Government Departments may not be in a position to lead such a struggle with complete freedom but this is no reason why my young friends here who are launching upon their career and who owe it to their mother institution should not see that it is not despised and broken when she can be improved and ennobled by their efforts. I therefore appeal to these young friends to put in all that they can in this struggle and allow the public to see the utility of the institution and ceaselessly carry on the propaganda until such time as the Government decides to maintain this institution in this city.

Once again, my friends, the old friends who have helped us and the young friends who give promise of helping us, all of them together and singly, I thank you. I thank you on behalf of dumb creatures whom you have been serving and whom you are likely to serve. Because the dumb creatures cannot express their thanks, I whose lot has been cast amongst them have to thank you on their behalf and again request you to carry on your noble profession of helping them.

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APPENDIX F

Thanksgiving Speech by R. N. NAIK, G.B.V.C.,
Bacteriologist, Bombay Veterinary College, Parel, Bombay.

President, R. B. Mankar and gentlemen,

It gives me great pleasure to propose a vote of thanks on behalf of the members of the Bombay Veterinary Medical Association to the President Rao Bahadur Mankar who has identified himself with our ambitious aspirations and who has given us a record address to-day, and also to the other guests who have given us the pleasure of their company on the occasion of this extraordinary session. Rao Bahadur Mankar is a very busy person; he has dedicated his life for the preservation and protection of cattle life. His activities in saving cattle from the grip of famine and from the cruel hands of butchers are wellknown. He has, in these days of scarcity of animals, volunteered to cooperate with the Government with the purse of the Humanitarian League, to save cattle by salvaging them to the up-country. He is thus doing a great service to the livestock which are essential for the prosperity of the Country. He has been a familiar figure in all meetings of the Indian Council of Agricultural Research, Delhi and in other meetings in this province held in connection with the salvage of and affording protection to cattle. Among the non-veterinarians he is one of the few who has studied the question of cattle thoroughly and is doing substantial humanitarian work all on charitable basis for the conservation of cattle life as silently as possible. We really feel proud and honoured of his presence here today as the goal of his League and of our association is identical although the ways adopted by each are different. Our Hearty thanks are due to him.

We are inspired with confidence and hope at the presence of Dr. Mohey Deen and Dr. Chadha and also of the presence of the retired men viz : Khan Saheb Dhakmarwala who is our living original preceptor of Veterinary Science in India, Rao Bahadur Phadke, the first Indian Principal and then the Director of Veterinary Services of Bombay Province and Sind, Prof. Miranda, Dr. D. S. Laud, Dr. Khaladkar and others. Without the goodwill, co-operation and healthy guidance of these men this association is not in a position to make a headway in asserting its rights and status; our Hearty thanks are due to them.

We feel very grateful to Dr. Koppikar and Mr. Mhatre and other guests who in warmly responding to our invitation have given us the pleasure of their company here to-day. I thank them heartily.

President and gentlemen, we consider that this extraordinary session is a momentous one. For, not only we have to transact a heavy agenda of business affecting the vital activities of the profession but also we are

meeting for the first time in the history of the Province in an atmosphere of freedom of thought and expression and of post-war plans. The freedom which our leaders have secured for us has made every Indian to be conscious of his rights because of his moral dignity as a person. This dignity of personality demands effective opportunity for normal life, growth, opportunity, happiness and security. If this is true of every Indian it should also be true of this Association. This body of Veterinary Scientists as it is constituted with the avowed object of furthering the cause of Veterinary Science in this Province has also secured an opportunity for development into a dynamic body of strength and power in all matters of Animal Science as in Western Countries. In the past, many of our resolutions and deliberations, appeals and advice sent to the Government have vanished in thin air, but I am certain that if we act wisely and tactfully we will be able to come into our own for being recognised by present democratic Government as an indispensable advisory body in the matters of breeding animals on the principles of preventive medicine or in other words maintaining a balance of health with a view to the production of animals, animal products, dairy products and poultry products. We have the knowledge, we have the enthusiasm and energy to play our part commensurate with the importance of our Science towards the production of protective food urgently needed for the country. We want opportunity; we want facilities; we want wide expansion of the department; we want research institutions in every branch of Animal (Husbandry and Veterinary) Science; and we want men, equipment and tools too. I have very strong reasons to attribute the existing poverty of India to the neglect of the Animal husbandry and Veterinary Science and if things are allowed to drift in any manner which is not based upon science I am afraid worse days will be ahead. For "Poverty is the parent of revolution and crime" says Aristotle. It is recognised in all prosperous countries that the prosperity is dependent upon the cattle wealth. The Editor of the Journal of American Veterinary Medical Association says in the last August issue that "The difference between the progressive West and the backward East is rinderpest". i.e. the progressive Western Countries directly attributed their prosperity to the eradication of rinderpest which they have achieved by rational planning. Truly it is stated that milk and honey flow in abundance where the Veterinary profession is well developed.

In the end, I thank our popular Principal, Dr. Mohey Deen and his staff for the co-operation extended in making the function a success. I thank the Principal and the Secretary, Society for Prevention of Cruelty to Animals for allowing to use this hall.

Again, on behalf of the members of the association, I offer hearty thanks to you all, for so kindly honouring us by your presence to-day in such an abundant measure.

Agriculture and rural Development
Department,
Bombay Castle, 28th August 1947.

From

The Assistant Secretary to the Government of Bombay,
Agriculture and Rural Development Department.

To

The President,
Bombay Veterinary Medical Association.

*Subject:—*Veterinary Department Preferential treatment to war
service personnel-in

Sir,

With reference to your letter No. 185 of 47 dated the 22nd July, 1947, I am directed to request you to give instances where Government have not cared to respect the grievances of the Veterinary Assistant Surgeons of the Civil Veterinary Department and have upheld the claims of war returned personel of the Department for appointments to higher posts without any justification.

Your obedient servant,

(Sd.)

*Assistant Secretary to the Government of Bombay,
Agriculture and Rural Development Department.*

Agricultural and rural Development
Department,
Bombay Castle 25th August 1947.

From

The Assistant Secretary to the Government of Bombay
Agriculture and Rural Development Department.

To

The President,
Bombay Veterinary Medical Association.

*Subject:—*Bombay Veterinary College Shifting of - to Poona.

Sir,

With reference to your letter No. 184 of 47, dated the 1st August, 1947, I am directed to say that Government has finally decided to move the Bombay Veterinary College from its present site at Parel to Poona.

Your obedient servant,

(Sd.)

*Assistant Secretary to the Government of Bombay,
Agricultural and Rural Development Department.*

UNITED PROVINCES ANIMAL HUSBANDRY STOCKMEN'S ASSOCIATION.

The first Annual Conference of the United Provinces Animal Husbandry Stockmen's Association was held at Meerut on the 14th, 15th and 16th July under the presidency of Mr. P. L. Sharma, Livestock Officer, Meerut.

88 Delegates attended the Conference. On the first day Mr. Mohd Ayub Khan, the Chairman of the Reception Committee, welcomed the members after which the President of the Conference delivered his Presidential address. In the course of his address, the President appreciated the enthusiasm of the organisers of the Conference in arranging this conference in the face of present day difficulties and hopes that such meetings would prove very useful to everyone. He then stressed the importance of livestock to an agricultural country and pleaded for untiring efforts to make the province self-sufficient in respect of livestock. The illiteracy and conservatism of the masses, he said, was difficult to deal with but that should not dishearten us. He finally sympathised with the Stockmen in their low scales of pay as compared with those obtaining in other department of Government and expected that they would get sympathetic consideration at the hands of the Government on proper representation through the Association. Lastly he wished the conference every success.

The remaining days of the conference were devoted to business meetings of the Association for passing of accounts election of office-bearers and the passing of rules and bye-laws of the Association. Shrimati Prakash Wati Sood, M.L.A., was elected President, Mr. P. N. Misra, Vice-President and Mr. J. P. Saxena General Secretary.

There were also interesting papers that were read at the Conference one on cattle Breeding by Mr. J. P. Kashyap and another on 'Importance of Animal Husbandry in Nation Building' by Mr. R. R. Pal Sharma.

After passing a number of resolutions for the improvement and the status of the Stockmen, the Conference ended.

THE MADRAS VETERINARY ASSOCIATION

Provincial Veterinary Conference

Under the auspices of the Association, the Eighth Provincial Veterinary Conference will be held at the Madras Veterinary College on the 26th, 27th and 28th December 1947.

Sri G. R. Viswanathan, G.M.V.C., P.G. (Edin. & Mukt.), Principal of the Madras Veterinary College, is the Chairman of the Reception Committee,

and the Honourable Minister for Development, Government of Madras, is being approached to open the Conference. The Reception Committee membership fee is fixed at Rs. 5/—and the Delegate fee at Rs. 3/—. Sri S. Vancheeswara Iyer, Assistant Disease Investigation Officer (Poultry) and Sri. V. Panduranga Rao, Assistant to Lecturer in Anatomy, as the Secretary and Treasurer respectively for the Conference. Any resolutions to be moved in the Conference should be sent to the Secretary not later than 20-12-47 and any remittances in connection with the Conference may be sent to the Treasurer. Those who are not members yet are requested to become members and it is hoped that a large number of the members will enroll themselves as Reception Committee Members or as Delegates and make the Conference a success. Professional papers, if any to be read in the Conference may be sent sufficiently early to the Secretary so that they may be placed before the Committee for their scrutiny in time.

Madras Veterinary College, }
28th Novr, 1947. }

M. R. SUBRAMANIA SASTRY,
Secretary.

Review

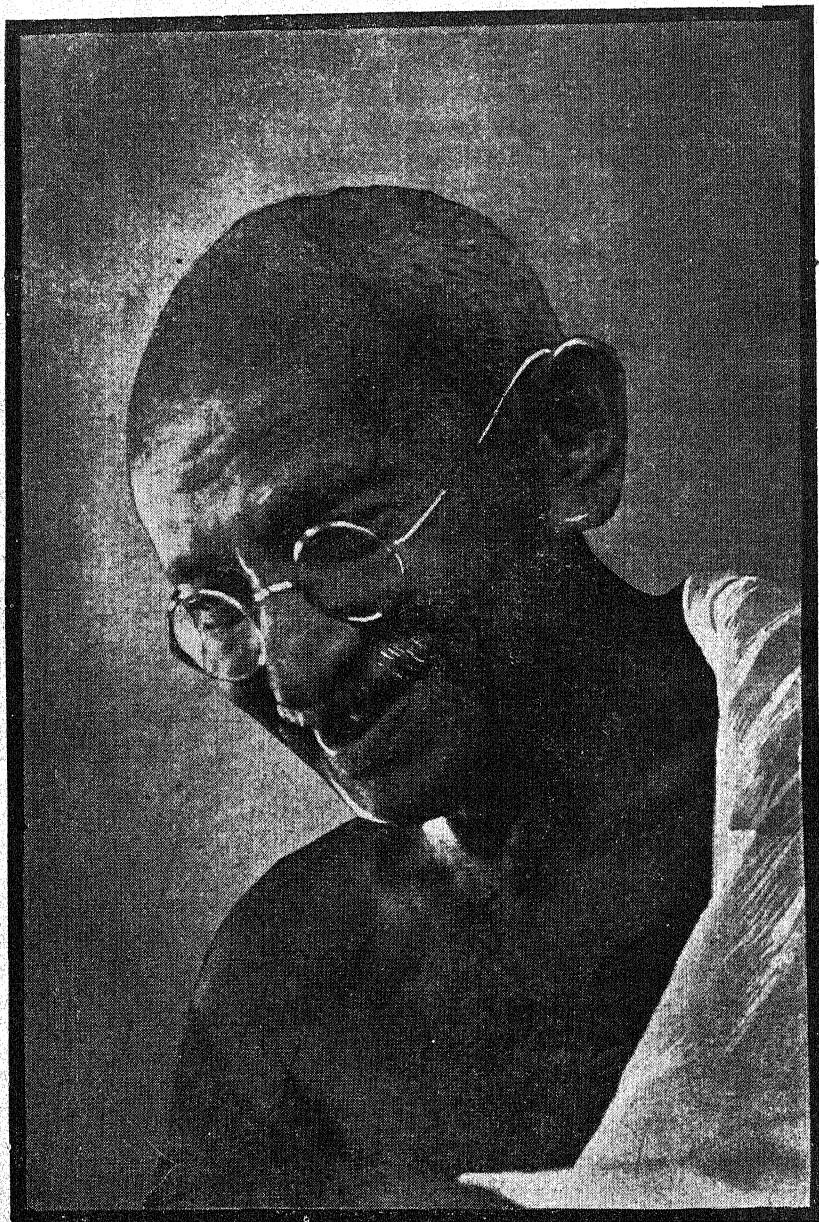
Veterinary Anaesthesia.—John G. WRIGHT, M.V.Sc., F.R.C.V.S., Second Edition, 1947 Pp. viii 218. 62 Figs, *Publishers Messrs. Bailliere, Tindall & Cox, London, W.C. 2. 12s. 6d.*

"The success of a Veterinarian as a Surgeon depends in no small degree on his knowledge of anaesthetics and his skill in their administration". These words of the author in the preface to the first edition of this book are very profound and true and will be agreed to by every practising Veterinary Surgeon. We are sure that this book on Veterinary Anaesthesia by Mr. John G. Wright, who is an expert in the line, would be found eminently useful by every practitioner. The subject has been dealt with in an excellent way, with attention to the minutest detail which is to be appreciated very much, under various heads like local, regional, general, etc. And the various agents that are recorded and used in these methods have also been considered at length. The author is a great believer in the Chlodral Hydras as a narcotic agent and therefore devotes one full chapter for discussing its administration and its dosage. In spite of his strong advocacy, the experiences of many in the field and also of the Army authorities during the recent war, have been otherwise. On the whole Veterinary Anaesthesia is a very useful publication which should be in the hands of every practising Veterinary Surgeon.

IMMORTALISED.

Never before in history did such a catastrophe overtake Mankind as when on Friday, the 30th January 1948, at 5-12 p.m., the Great Apostle of Peace, the very embodiment of Ahimsa and the wonderful personification of Love and Truth, Mahatma Gandhi, was fatally shot by an insensate assassin. The Father of the Nation, Bapuji, as he was affectionately known to us, is dead and gone. The news has descended on us with sweeping suddenness. The shock has, indeed, been terrible and it has overtaken the world with the impact of a thousand atom bombs dropped simultaneously. Humanity is stunned beyond expression. A vacuum has been created. Oh! What a calamity to our country, no, not only to our country, but to the whole world! Is there any other to fill up this void? In a warring and weary world, where hatred, violence and cruelty has become a creed, where virtues have lost their values and vices are exalted, and where God has been dethroned from human hearts, this frail old man of eighty, held aloft his gospel of Peace and Love, Truth and Non-violence and preached sanity and sobriety, charity and good will with his simple living and high thinking. He lived and worked to save mankind from the terrible abyss to which it has been rushing headlong. He was straining every ounce of his energy to arrest the moral degradation which was overtaking humanity. His efforts in this direction during the past half a century and more were just nearing fruition. Now, more than ever, we, in this country especially, are in need of him and his guidance. That, however, was not to be! Alas! the cruel hand of Fate has descended on him and smitten him. The purest living soul has, in the twinkling of an eye, been removed from our midst. Friend of all and enemy of none, Mercy and Compassion incarnate, he was a comfort and a solace to millions and millions of men, women and children. His removal at this juncture plunges all of us into darkness and leaves us forlorn! Truly, has it been said God's ways are mystifying and inscrutable. We doubt not that the cause he has been championing—Peace and Love—love thy neighbour, love thine enemy—is to flourish and shine all the better now that he has gone from this mundane world and become immortal! Gandhiji dead will be more potent than Gandhiji alive. His frail body may perish and get reduced to ashes, as indeed, it has been on the banks of the sacred Jumna. His undying spirit, ever watchful and solicitous to our welfare, is hovering over us and guiding our thoughts and actions. He is enshrined in our hearts. And so, we will strengthen and fortify ourselves: practise his precepts, by deeds, and not by words by action and not by inaction: above all, not give way to despair and distress - the thing which will not be to his liking.

GANDHIJI IS DEAD—LONG LIVE GANDHIJI.



MAHATMA GANDHI

THE APOSTLE OF TRUTH AND NON-VIOLENCE

[Born October 2, 1869.]

[Died January 30, 1948.]

PRIME MINISTER NEHRU'S BROADCAST TO THE NATION.**"WE MUST HOLD TOGETHER"**

The Prime Minister, in a voice trembling with emotion, said, "Friends and comrades, the light has gone out of our lives and there is darkness everywhere. I do not know what to tell you and how to say it. Our beloved leader, Bapu as we called him, the Father of the Nation, is no more. Perhaps I am wrong to say that. Nevertheless, we will not see him again as we have seen him for these many years. We will not run to him for advice and seek solace from him and that is a terrible blow not to me only but to millions and millions in this country. And it is a little difficult to soften the blow by another advice that I or anyone else can give you.

"The light has gone out, I said, and yet I was wrong. For the light that shone in this country was no ordinary light. The light that has illumined this country for many more years and a thousand years later that light will still be seen in this country and the world will see it and it will give solace to innumerable hearts. For that light represented something more than the immediate present; it represented the living truth, the eternal truth, reminding us of the right path, drawing us from error, taking this ancient country to freedom.

"And this has happened when there was so much more for him to do. We could never think that he was unnecessary or that he had done his task. But now, particularly, when we are faced with so many difficulties, his not being with us is a blow most terrible to bear.

"FACE THE POISON IN PUBLIC LIFE"

"A mad man has put an end to his life, for I can only call him mad who did it and there has been enough of poison spread in this country during the past years and months and this poison has had effect on people's minds. We must face this poison, we must root out this poison and we must face all the perils that encompass us, and face them not madly or badly but rather in the way that our beloved teacher taught us to face them. The first thing to remember now is that no one of us dare misbehave because we are angry. We have to behave like strong and determined people, determined to face all the perils that surround us, determined to carry out the mandate that our great teacher and our great leader has given us, remembering always that if, as I believe, his spirit looks upon us and sees us, nothing would displease his soul so much as to see that we have indulged in any small-minded behaviour or any violence.

"So we must not do that. But that does not mean that we should be weak but rather that we should in strength and in unity face all the troubles that are in front of us. We must hold together and all our petty troubles and difficulties and conflicts must be ended in the face of this great disaster. A great disaster is a symbol to us to remember all the big things of life and forget the small things, of which we have thought too much. In his death he has reminded us of the big things of life, that living truth, and if we remember that, then it will be well with India."

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General Articles

SOME ANIMAL HUSBANDRY PROBLEMS*

By

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Director of Veterinary Services, Madras.

I am very pleased to have been given an opportunity of meeting representatives of your Association this morning and I intend taking advantage of it by saying a few words on some of the Animal Husbandry problems that confront us and the lines on which as a Department we might progress and expand. As you are all aware the present organisation for dealing with Animal Husbandry matters consists of a Veterinary College for the training of the required staff, a Serum Institute for the manufacture of the biologicals used in the prevention and control of contagious diseases, Veterinary Hospitals and Dispensaries for the treatment of surgical and non-contagious conditions and Government farms which are primarily required for the production of pure-bred male breeding stock. Specialist officers both on the disease and developmental side are also included among the Technical staff.

To appreciate and deal with the problems that confront us, it is very desirable to have a highly trained technical staff and we have endeavoured as far as possible to provide a training in the Madras Veterinary College suitable for the purpose. In addition to the ordinary lectures, students are given ample opportunities of acquiring a good practical knowledge of Laboratory technique, clinical work and practical farm work. Those of you who have been qualified for some time and have had experience of 'field' work will appreciate our limitations and the enormous amount of investigation work that requires to be done to enable us to come to grips with some of the disease problems confronting us. Our work to-day embraces a very wide variety of subjects. There is not only the treatment and control of disease but also the general improvement of the various types of animals by improved breeding methods, better feeding and management.

* Address at the Conference of the Madras Veterinary Assistant Surgeons' Service Association on 24th December 1947.

The study of animals in health and the essentials necessary to keep them healthy is to my mind more important than the study of diseased animals and the essentials necessary to cure them. The Veterinary Graduate of to-day must have a good knowledge of Genetics, he must be able to give sound advice on nutritional requirements and general management of the various animals and be in a position to make intelligent observations and carry out preliminary investigation work on the various disease problems met with. Among the staff in the present administration, the Touring Veterinary Assistant Surgeon is the person in the best position to appreciate our present limitations in dealing with disease problems. The nature of his work brings him into contact constantly with the ryots and their animals and from his observations and enquiries he should be largely responsible for initiating investigation work. There are, of course, his ordinary routine duties to be carried out such as the attendance and control of the well known contagious diseases, inspection of livestock and systematic castration but he should in addition endeavour to find if what I might call "hidden diseases" are prevailing which may be of protozoan, helminthic or nutritional origin. Even among the well known contagious diseases, the information available on many points is not very clear. Take for example Rinderpest, Blackquarter and Haemorrhagic Septicaemia; there are many questions about these diseases which still require an answer. For example—do young animals get Rinderpest?—is there any difference in susceptibility or immunity between the progeny of an immune dam and a susceptible dam?—Is Rinderpest in cattle transmitted under natural conditions to sheep and goats? If so, are they just as susceptible as cattle—less so or more so?—Is Rinderpest transmitted in the 'field' from sheep and goats to cattle? and, if so, is the disease then in cattle less or more virulent than normal, less or more contagious? In the case of Haemorrhagic Septicaemia and Blackquarter, is there any correlation between rainfall and the incidence of the disease? Are there more outbreaks during wet years than dry years? Has nutrition anything to do with the incidence of the disease? In years when there is an acute shortage of fodder, do we get more or less outbreaks? These are general questions which I should like to see being kept constantly before the minds of the staff and each member should be able to supply the answer as far as his own jurisdiction is concerned. I should therefore like to see every member of the staff thinking on those and similar lines and, by so doing, we shall be advancing our professional knowledge and will be in a better position to give better service to the ryots. These examples I have mentioned are straightforward ones and only require a little enthusiasm on the part of the staff to supply the answers. Others, however, are more difficult. Take for example, the under-development or stunting of many of the animals in various parts of the Presidency—Why is there such a vast difference in the size and type of the animals in the different parts? In the wet coastal

areas such as the West Coast, the animals are small and puny. In the highly irrigated areas such as Tanjore, the animals are small but sturdy in hilly forest areas, where there is good deal of pasture and one would expect to find better developed animals, they are usually small and puny, whereas in some of the drier tracts like Coimbatore and Ongole, the animals are larger and better developed.

What is the cause of this difference? Is it due to climatic conditions, nutritional, obvious starvation or a deficiency in the food, protozoan, intestinal parasites etc.?—one factor or all combined? These are problems which the Veterinary Assistant Surgeon must keep constantly before his mind and from observations, enquiries and preliminary investigation, he may perhaps suspect a particular factor. He should then bring it to the notice of the Department when the question of having further investigation carried out would be considered.

Each Veterinary Assistant Surgeon working and thinking on these lines would not only keep the Department alive professionally but would result in the creation of highly trained investigators to meet the demand for unravelling the problems encountered.

Human nature being what it is, it is very easy for all of us to fall into the ordinary routine way of carrying on and if we all do that, then the department carries on in a routine way with the result that there is no progress and instead of advancing we shall start retreating. I would therefore urge upon you all the importance of thinking and working on the lines I have suggested. You are the men who come into contact with the animals and their owners, you are the men who should know the lines on which research work is required.

You are all aware of the proposals made for the expansion of the Department in the post war period, but unfortunately very little headway can be made. One of the proposals is to have a Veterinary Institution as well as a Touring Veterinary Assistant Surgeon with a Stockman-compounder in each taluk. This proposal can only be given effect to as and when technical staff become available, and every endeavour is now being made to train the maximum number possible. Another proposal is to have all Veterinary hospitals constructed with type design buildings and avoid the necessity of having to carry on hospitals in rented buildings which for many reasons are unsatisfactory. This proposal is being kept in abeyance owing to the high cost of building materials at the present time.

In connection with Livestock Improvement work there is a proposal to have a Livestock Farm as well as a Poultry Farm in each district to make available pure bred male stock for breeding purposes. Progress is being made in this direction and it is hoped that a few farms will be opened in the near future.

When these proposals are completed there will be a Veterinary Hospital according to type design in each taluk—a Touring Veterinary Assistant Surgeon with a Stockman-compounder in each taluk and a cattle farm and a poultry farm in each district. These proposals may be considered under the ordinary routine expansion of the Department but with the staff working and thinking on the lines I have suggested, expansion on the investigation side will automatically follow. There should be at least one fully staffed section carrying out investigation work on the needs of the Province on all Animal Husbandry subjects—Bacteriology, Genetics Nutrition, Physiology, Toxicology, Parasitology, to mention some of the important ones and, as I visualise it, all these sections should be engaged in not only their own investigation and research work but should be kept busy in answering queries sent to them by the 'field' staff as well as examining material for diagnostic purposes. A time may come when this work may develop to such an extent that it may be necessary to have a small laboratory in each district where material could be examined and which would relieve the central laboratories of much of the routine work. This picture of the future department which I have tried to place before you depends very largely on the enthusiasm of the 'field' staff and before closing I should like to stress upon you once again the desirability of each man thinking and working on the lines I have suggested.

DISTEMPEROID VIRUS—CLINICAL OBSERVATIONS ON ITS VALUE IN DOGS IN THE PHILIPPINES

By

L. M. YUTUO,

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Canine distemper is common among dogs in the Philippines. It is safe to state that about one-half of the canine population succumb from distemper yearly. In the control of the disease, vaccine and sera together with sulfa preparations and good nursing have been used extensively. Although the use of Laidlow-Dunkin vaccine especially the triple-injection-method has been quite successful, the results recorded on the use of homologous serum in distemper have been, at best, uncertain. Moreover, it is expensive. In certain cases met with and treated with serum the good results obtained seem to indicate that good nursing bore more credit in recovery of cases than the serum alone.

Since the termination of the second World War and the liberation of the Philippines, a new agent became available through the Winthrop Chemical Company, Manila in the control of canine distemper. The agent

is a modified virus of canine distemper obtained by repeated passage through ferret. To Robert G. Green (1939) of the University of Minnesota belongs the credit of having evolved this biological agent. It is a by-product of his investigation on the control of fox distemper in the fox-farm of the From Brothers of Hamburg, Wisconsin.

As a preventive measure, distemperoid virus has been tried on a great number of dogs in the Philippines. In my personal cases, no untoward sequelæ have been noted beyond a slight rise in temperature. Some of the dogs treated prophylactically belong to such breeds as Dobberman Pincher, Irish setter and German Police dogs. Moreover a number of the dogs treated were puppies of approximately 8 weeks old. In two other veterinary hospitals in the city of Manila, information gathered tends to support my finding. The results thus far recorded, however, do not mean to give the impression that the biological product is 100 per cent effective. In fact, one veterinarian had the bad luck of having his first two cases coming down with distemper after prophylactic vaccination. Such cases are few and far in between the good effects of the virus as a preventive measure. A number of contra indications should be observed before giving the virus. For example dogs showing symptoms of rickets, avitaminosis, malnutrition, internal parasites, convulsions and so on are considered poor risks for any potent vaccination. Therefore, a thorough examination to determine the presence of any of the adverse conditions should be made. In the first few cases, I had the good fortune to vaccinate, the dogs were observed for a period of a week, the temperature, pulse and respiration being noted together with fecal examination for internal parasites, before the virus was given. This observation was further extended for another three weeks thereafter for possible post-vaccination after-effects. The prescribed dose is 25 milligrams of the virus in horse-serum and diluted with 2 cc sterile distilled water shortly before use. It is important to point out at this instance, that the bigger the dose of the virus the lesser is the reaction of the vaccinated animal.

The curative value of the distemperoid virus had also been exploited in a number of cases kept in the small animal clinics of the College of Veterinary Science, University of the Philippines, Pandacan, Manila. For the sake of brevity, only a few cases will be presented here.

The first case was a male, native dog, brown color, seven months old and of about 18 pounds in weight. It was presented for treatment on 2nd May, 1947 with the complaint of loss of appetite and trembling.

Clinical examination revealed the temperature to be 40.6°C and there was purulent discharge from the eyes and pustular skin eruption abundant especially in the abdominal region. Condition of the dog at the time of the examination was fair.

The case was diagnosed as distemper.

Treatment:—Given two tablespoons of milk of magnesia.

May 3. Temperature 39.6°C; injected 25 milligrams distemperoid virus subcutis. Fed milk.

May 5. Temperature 39.2°C; one multivitamin tablet given; milk diet.

May 6. Temperature 38.6°C; skin eruption dusted with sulfanilamide powder; one tablet of sulfaguanidine; milk diet and bread.

May 7 & 8. Temperature 38.4°C; multivitamin tablet.

May 12. Thirteen days after admission, the case was declared cured. A week thereafter, the dog developed spasms of clonic type in one of the upper eye-lids. It, however, disappeared spontaneously after an elapse of 60 days.

The next case was a grade German Police dog, one year old and weighing about 20 pounds. It was admitted on July 29, 1947 with the history that it was off feed and depressed. It had also lost weight considerably.

The symptoms noted at the time of examination were: temperature 41.3°C; watery discharge from the nose and eyes; animal greatly depressed.

Diagnosis—Distemper.

Treatment:—Two tablespoons of milk of magnesia; after an hour injected distemperoid virus.

July 30.—40.1°C; given suds enema; milk diet.

July 31.—40.7°C; multi-vitamin one tablet; milk diet.

Aug. 1.—39.4°C; sulfaguanidine one tablet; milk diet.

Aug. 2.—38.0°C; multi-vitamin and milk diet.

Aug. 3-15.—Treatment as above repeated. On the tenth day the animal sent home with instruction to give the dog, milk and toasted bread as diet. Multi-vitamin to be continued for another week. After a month the dog was seen in a good condition.

The third case of Distemper was a female dog of about 10 months old; breed, mongrel; weighing about 18 pounds. Admitted July 25, 1947 with history of loss of appetite and coughing. The owner stated that she lost a dog recently with symptoms very suggestive of canine distemper.

The dog had cutaneous eruptions in the abdominal region and the inner aspects of both the thighs. Temperature was 39.6°C.

Treatment.—Milk of magnesia; injection of distemperoid virus. Externally sulfanilamide powder. The day following, multi-vitamin; diet milk. This line of treatment was continued until temperature went down

and the appetite returned to normal. After two weeks the case was discharged cured. Unfortunately, after another month the same animal returned with rabies, from which the dog died two days later. Laboratory examination of the brain revealed Negri bodies.

The fourth case was a 3 month old pup, female and weighed about 8 pounds. Admitted September 8, 1947 with the history—loss of weight and poor appetite. Symptoms: Temperature 39.4°C; bowels loose, chocolate color with an offensive odor; pustular skin eruptions almost all over the body; purulent discharge from eyes and nose; condition poor. Faecal examination revealed eggs of hookworm.

The case was diagnosed as distemper with hookworm infestation.

Treatment.—Milk of magnesia two teaspoonfuls; distemperoid virus 12 milligrams.

September 9. Temperature 38.9°C; multi-vitamin; sulfanilamide powder externally; milk diet.

September 10 to 13. Temperature ranged 38.6°C to 39.0°C; multi-vitamin daily alternated with sulfaganidine tablet; milk diet.

September 14 to 25. Animal progressively improved until discharged, cured.

The fifth case was a mongrel, male, black pup of 5 months old. Weight about 6 pounds. Admitted September 8, 1947. The owner complained of bloody diarrhoea with poor appetite.

The animal had a temperature of 39.9°C; at the time of examination. The pup was much emaciated; the mucous membrane was pale and there was purulent discharge from eyes and nose. From time to time the pup sneezed out a good amount of nasal exudate. Bowel evacuation bloody; skin eruption purulent in character and generalized. Foecal examination revealed heavy infestation of hookworm. The case was diagnosed distemper with hookworm infection.

Treatment.—The case was treated in almost the same manner as the above cases with the exception that the distemperoid injection was repeated after a week. When the appetite was sufficiently restored, the pup was given one cubic centimeter of tetrachlorethylene in a gelatin capsule followed three hours later with milk of magnesia to rid the animal of hookworm. Thereafter, the improvement was rapid. The temperature dropped to normal after 10 days hospitalization. The animal was discharged twenty days later.

The sixth case was a Dalmatian male pup of about 4 months old. The owner told us that the dog would not eat for about four days and that it had loose bowel evacuation. Moreover, she added that she lost one dog, a companion of the pup from what appeared to be canine distemper.

Clinical manifestations were pustular eruptions with a temperature of 39.9°C; muco-purulent eye secretion and dejected appearance. The treatment instituted was essentially the same as for the above described cases with complete recovery in three weeks period.

These six cases illustrate the good merit of the virus as a curative remedy against canine distemper. In the fourth and fifth cases, the puppies were concurrently affected with hookworm and yet both of them recovered completely from distemper. The value of proper nursing and the use of sulfa drugs should be exploited during the course of the treatment. In the private veterinary hospitals in Manila, Penicillin is also used together with the virus with satisfactory results. The use of sulfa preparations or Penicillin as an adjunct treatment in distemper in dogs is with a view to combating the secondary organisms developing in the course of the disease, as these preparations are known in general to be of little value in virus diseases both in man as well as in animals. Lastly, the results presented in this short communication furnished an added data supporting the findings of Green and Swale (1939), Schlothauer (1943) and Khuen (1945) on the value of distemperoid virus both as a preventive and curative agent against distemper.

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DICHLORO DIPHENYL TRICHLOROETHANE (D.D.T.)*

A Complete Review of Literature

By

V. S. ALWAR, B.V.Sc.,
(Madras Veterinary College)

GENERAL

History:—It was Othman Zeidler, a German Chemist, who, in a search for dye intermediaries, synthesised D.D.T. for the first time in 1874, in Strasburg, though he could not have even dreamt of its remarkable potentialities as an insecticide. Paul Lauger and Paul Muller, the two Swiss Chemists of the Swiss dye-stuffs firm of J. R. Geigy, S.A., Basle, Switzerland, found in 1939 that this substance was toxic to bugs and Colorado potato beetles and subsequently in 1940-41 used it effectively to control a plague of Colorado potato beetles in Switzerland and saved the Swiss potato crop. The firm took out an initial patent in Switzerland in 1940. In 1941, Geigy firm notified their United States as well as United Kingdom branches that the new insecticide was found effective against the Colorado potato-beetle, and they, in their turn, brought this compound to the notice of their respective Governments. In 1942, they took out patents in both the countries and published the scientific details, Towards the end of 1942, in the trade, an insecticide containing D.D.T. as an active ingredient was marketed in United States as "Gesarol" and in Great Britain as "Neocid" by the Swiss firm. This came very handy and at a welcome moment for the allies during the World War II when they were experiencing difficulties in obtaining supplies of established insecticides for controlling insect-borne diseases.

In the early part of the war, the allied powers had to face a serious handicap in the absence of a wholly synthetic insecticidal substitute for the plant products—pyrethrum and derris of established repute. Japan's entry into the war and the subsequent occupation of Malaya, not only cut off completely supplies of derris and 70% of pyrethrum, but also resulted in the extension of the conflagration into the tropical jungles where the insect menace, and consequently the need for effective insecticides, were the greatest. To make matters worse, the 1942 pyrethrum crop in Kenya was poor. A limited supply of rotenone, inferior as an insecticide to that derived from derris, was available in South America from the plant *Lonchocarpus* but even this supply was unequal to the demand. So in 1942 the demands of the Allied services were for increased supplies of insecticides for use against the malarial mosquito and typhus carrying louse. Scientists were called upon to work on the problems

* Read at the Annual General Body Meeting of the Madras Veterinary Assistant Surgeons' Service Association, on 25th December 1947.

of evolving a suitable and effective synthetic insecticide both in United Kingdom and United States and that on mass production scales. More attention was therefore concentrated on D.D.T. towards this object.

In the Orlando Laboratory in U.S.A. experimental studies were undertaken with "Gesarol" which revealed a wide field of usefulness. In England the results of some of the earlier tests made in Buxton's department at the London School of Hygiene were astonishing, since the chemical proved lethal to lice and bed bugs. When a British mission of which Buxton was a member went to America, early in 1943, to reach an agreement on the conservation of pyrethrum supplies, it came to be known that Americans had made preliminary tests with the same results. Further researches were carried out rapidly and thoroughly by entomologists, chemists, medical and veterinary men at a number of laboratories both in England and America. Collaboration in this work between the two countries resulted in the production of D.D.T. on a large scale to meet the pyrethrum deficit. Methods of manufacture were improved and the various impurities in commercial samples were isolated and examined. The composition of active principle was determined by Haller in U.S.A. and Martin and Wain in England in 1943 and the same was synthesised. This in brief, is the history of the evolution of D.D.T. which has proved to be one of the wonder drugs which World War II has helped to achieve.

The Allied Army vigorously made use of D.D.T. with signal success. The first full scale use of D.D.T. in a war sector was in Italy—to protect fighting men against Typhus. In the control of Typhus outbreak in Naples. in January 1944, 1,300,000 civilians were dusted with D.D.T. powder and, within 3 weeks, the outbreak was completely under control. This was the first occasion in the history of Medical Science when a Typhus outbreak was arrested in mid-winter in a City full of dirty, homeless lousy refugees. An outbreak of plague in Algiers was also dealt with successfully by D.D.T. in 1943. Symes and Hadaway of Colonial Insecticide Research of Great Britain performed some striking experiments in British Guiana in 1944, and found that, under suitable conditions, the mosquito population in houses could almost be completely annihilated by means of this new insecticide and the number of larvae in breeding grounds could be greatly diminished. Later D.D.T. was successfully used to augment the forceful drive against malaria around the globe and notably wide use of it was made in the Far-Eastern Theatre of War to save the fighting forces from the dreadful toll of malaria. Most novel methods of using this insecticide, as for instance, by spraying it from aeroplanes, were also employed.

On the cessation of hostilities much of the work carried out under the aegis of various governments which were still then kept confidential was published. D.D.T. was released for civilian use and the gift of science is now available for a wide range of insecticidal applications. Further researches were carried out in various fields—medical, veterinary and agricultural—in

almost all the scientifically advanced countries. Besides, many countries have projected the manufacture of D.D.T. Our country also does not lag behind. Alembic Chemical Works already manufacture this synthetic product. The advertising machinery of the Geigy Firm is endeavouring to popularise their "Neocid" through the columns of several newspapers and periodicals in this country.

Chemistry:—D.D.T. is the abbreviation for the substance Dichloro-diphenyl—trichloroethane and the term "pure D.D.T." designates paraparadichloro diphenyl trichloroethane. The organic chemical is 1.1. bis (p—chlorophenyl) 2.2.2. trichloroethane. An alternative is 1.1. bis (4 chlorophenyl) 2.2.2. trichloroethane. The figures "1" and "2" may also be replaced by α & β respectively. (This chemical is also mentioned as 2.2. bis (p. chlorophenyl) 1.1.1. trichloroethane with the alternative mentioned above.) The chemical formula is $(\text{ClC}_6\text{H}_4)_2\text{CHCCl}_3$.

For the synthesis of D.D.T. the raw materials required are chlorine, alcohol and benzene from which anhydrous chloral and chlorobenzene are made. The two compounds are then condensed in the presence of Con. sulphuric acid and from this mixture, when poured into water, D.D.T. is precipitated. The predominant compound of the dried precipitate is $\alpha.\alpha.$ bis (4 chlorophenyl) $\beta.\beta.\beta.$ trichloroethane. An isomer of lower insecticidal potency—"iso" D.D.T. is also present. 14 other compounds have also been isolated from the "crude" D.D.T. The whole precipitate termed "crude" D.D.T. is liable to contain small quantities of the substances used in the manufacture e.g., mauo chlorobenzene and sulphuric acid. They can be removed by efficient washing and filtration. Small quantities of chloral may also be present.

Pure D.D.T. content of the crude stuff is normally 65 to 80%. "Iso" D.D.T. alone exists to the extent of 10 to 25%. D.D.T. and "iso" D.D.T. account for 85 to 90%. The fourteen substances usually account for 80 to 93.5% of the total. Normally the crude substance should contain at least 70% of D.D.T.

Properties:—D.D.T. is a white powder. It has a faint pleasant smell. It is tasteless. Pure D.D.T. crystallises in the ortho-rhombic system and the crystals are long, tabular needles. The melting point is 107° to 109°C . The melting point of mixtures of D.D.T. and "iso" D.D.T. is 59°C . The substance for insecticidal use should have at least a melting point of 89°C . The density is 1.556. Its vapour pressure is low and is 1.3×10^{-7} mms mercury at 20°C .

It is nonvolatile and resistant to exposure. It is very stable even to chemicals and in most ways inert. It is affected neither by boiling water nor by aqueous acids or alkalis. It can be distilled without decomposition under reduced pressure and can also be distilled in super heated steam. But on distillation at atmospheric pressure it loses one molecule of hydrogen chloride to give the substance, "D.D.T. dehydrochloride". This reaction is also most

readily accomplished by the action of alcoholic potash. This reaction explains the non-toxic nature of D.D.T. when it is used on recently white washed surfaces since hydrated lime neutralises its active components with the formation of non-toxic D.D.T. dehydrochloride.

It is very sparingly soluble in water, less than 0.2. parts per million and soluble in varying degrees in organic solvents. Jones et al, (1945) have studied the solubility of this substance rather extensively. It is moderately soluble in petroleum fractions as Kerosene and Crude oil and fatty oils, readily soluble in common organic solvents as Chloroform and Ether and freely soluble in Carbon di sulphide, benzene and xylene. Pure D D T. does not act on packing materials and on metals generally including those used for containers.

Pharmacology:—D.D.T. is highly toxic to nearly all insects, in fact to most arthropods; and less so to mammals, but cold blooded ones are relatively more susceptible. CH Cl₃ group of D.D.T. is associated with the insecticidal activity. It acts both as a contact as well as a stomach poison. As a contact poison it penetrates the surface of the insect, the tarsi being one of the ports of entry. It attacks the nervous system in a rather functional than organic basis. It affects the nerves controlling the mouth parts with the result that the insects cannot feed and die of starvation. Roeder and Weiant (1946) observed that tremors characteristic of D D T. poisoning were due to an intense afferent bombardment of the motor neurons. Vaz et al (1945) draw the conclusion that the symptoms of D.D.T. poisoning are due to a lowering of serum calcium level. Tobias et al (1946) observe that the high toxicity of D.D.T. applied to the surface of insects contrasting with the low toxicity of D.D.T. applied to the surface of mammals is due to its efficient absorption by insects and not by mammals. The action of D.D.T. can be characterised as a "slow knockdown but sure kill" and the insects coming in contact with the chemical may not die for an hour or more. It is neither a repellent nor is it ovicidal. It does not attack pupae though frequently the adult will pick up a lethal dose during emergence. In some cases it is a larvicide, especially mosquitoes but with other insects as flies the larvae are not affected. Its outstanding feature is its residual toxicity. It clings to objects and remains effective for weeks and months. It is a cumulative poison. It has been found in all tissues examined and the highest concentrations are present in the bile and fatty tissue. The insecticide is eliminated through milk, faeces and urine.

In animals skin absorption from the powder form or from aqueous suspension is apparently negligible. But oily solutions of D.D.T. and those dissolved in organic solvents are absorbed by intact as well as abraded skin to the extent of producing all the manifestations of toxicity. Absorption of the powdered form through the gut though not great is nevertheless variable and irregular, probably, depending on the fat content of the diet. D.D.T. is absorbed to the extent of 50 to 95% of a single dose administered in oil. Inhalation of D.D.T. spray has also the poisoning effect. The novel method of feeding this chemical to

animals which will become lethal to ectoparasites has also been investigated. Reports of feeding tests with D.D.T. to rabbits to kill bed bugs are very encouraging.

Preparations:—As it is, D.D.T. is highly concentrated and very powerful and so it has to be prepared for use with suitable diluents and admixtures. The decision as to which form should be used depends on the requirements. The methods of use also depend upon the admixtures used. Jones et al (1945) have given the various preparations of D.D.T. for insecticidal use. The preparations are classified as follows :—

1. Solutions. 2. Emulsions 3. Suspensions. 4. Oily dressings.
5. Ointments. 6 Soaps. 7. Powders. 8. Paints and distempers. and 9. Aerosols.

Solutions:—Solutions are usually prepared in kerosene, because of its ready availability. Other petroleum products as fuel oil, gas oil, lubricating oil also can be used in conjunction with or in the place of kerosene. D.D.T. is not very soluble in kerosene; a 5% solution is nearly saturated. And therefore, to increase the solubility for higher concentrations, some auxilliary solvents are used such as Cyclohexane, benzene and xylene. Kerosene forms an important constituent in the solution of D.D.T. and 5% solution is the one commonly used. But kerosene is somewhat irritant to the operator and except in very small doses has deletrious effect on foliage and fish population. Because of its poisonous nature and combustible property great care is needed in the use. Animals should not be sprayed and adequate precaution is advisable against contamination of food and fire bazard. Xylene is also inflammable and so precautions against fire and explosion must be taken when it is incorporated.

Since the solvent kerosene is volatile, it is widely used as a residual spray to control disease carrying insects over wide areas. In the form of spray it attacks insects in flight, permeates into the hidden habitations and leaves a deposit which is toxic for days to months. When drops fall on water in the breeding place of mosquitoes they spread on the surface killing the larvae. In India the medical directorate G.H.Q., in collaboration with the Malarial Institute carried out aerial spray of 5% D.D.T. solution in kerosene and found vegetations in those areas considerably scorched

Since the watery areas as the breeding places of the malarial vectors are the main target of the solution in kerosene so extensively used in the form of spray, great care has to be exercised in the use of D.D.T over water stocked with fish since fishes are relatively more sensitive to D.D.T. Ginsburg (1945) by his laboratory experiments showed that it is highly toxic to Gold fish and also observed that this chemical was toxic to three kinds of fishes. Cotton and Higgins (1946) observed that when D.D.T. solution was applied from aircraft for the control of insects, invertebrates and cold blooded vertebrates were more

readily affected than birds and mammals and all concentrations caused mortality of fish. Eide et al (1945) noted that D.D.T. in concentration greater than 0.1. part per million is toxic to Gold fish in laboratory tests but in field tests surface application of D.D.T. as dust and in oils were not harmful to fishes when the lethal dosages for mosquitoes were used.

Emulsions :—The difficulties and defects mentioned in kerosene solution have led to the use of emulsions. They are prepared as solutions usually of high concentrations (25 to 35%) of D.D.T. in an organic solvent with an emulsifying agent added. This can be diluted with water to the final desired concentration. The advantage is that D.D.T. can be delivered in the form of an emulsion concentrate which only requires dilution with water before use. Besides they are less aggressive to the operator than oil solutions.

The solvents must have a low specific gravity and be capable of dissolving large amount of D.D.T. A fairly satisfactory emulsion can be made by stirring together a solution of D.D.T. in an aromatic hydrocarbon and 1% solution of soap in water. The emulsion used by Govinda Rau et al (1947) with good results was prepared in kerosene using liquid soap as an emulsifying agent. The idea of emulsion is lost completely here. Since the undesirable kerosene is still used, it will not in any way improve the sparingly solvent power of kerosene. The following are some of the formulae of D.D.T. emulsion.

1. D.D.T.	...	25 parts.
Toluene.	...	33.35 parts.
Turpentine.	...	33.35 "
Rectified spirit	...	4.9 "
Dry soap	...	2.8 "
Water.	...	0.6 "
2. D.D.T.	...	16.67%
Naptha.	...	41.66%
Fixanol "C"	...	4.6%
Water.	...	37.5%
3. D.D.T.	...	25%
Xylene.	...	68%
Triton-x—100	...	7%
4. D.D.T.	...	25%
Xylene.	...	44%
Butyl cellulose	...	6%
Nacconol NRSF	...	12%
Water.	...	13%

The emulsions are used as residual sprays for premises and can also be used on animals. But its use must be restricted since D.D.T. is in actual solution in the organic solvent and increased absorption must be expected. The possible irritating effect of the solvent on the skin and its inflammable nature must be taken into consideration.

Suspensions:—D.D.T. powders in talc. well ground with only water or soapy water to a pasty consistency, may be diluted with water upto a suspension of 1 to 2 per cent. Wettable D.D.T. powders containing the active principle and a dispersing agent or wetting agent which increases the stability of the suspensions are those commonly used. These suspension powders are mixed with about an equal amount of water into an even thin paste. The paste is mixed with the required amount of water and stirred well. The suspensions tend to settle rapidly but they are quite satisfactory if used immediately after dilution with agitation during use as spray or dip. It is advisable not to make large quantities. Powders of this nature are available with Geigy firm under the name of "Product 1050"—50% suspension powder. Colloidal suspensions prepared by dissolving D.D.T. in a water-miscible solvent with a wetting agent and adding the solution to water are much more stable even at high concentrations. Geigy firm recommends 1% suspension for small animals. For cattle one quart of suspension made from 20 lbs. in 100 gallons of water is recommended as a spray. For use in dip baths 30 lbs. in 1000 gallons of water are indicated.

These suspensions are quite safe and can be used on domestic animals for the control of ectoparasites.

Oily Dressings:—Govinda Rau et al (1947) prepared the oily dressings by mixing D.D.T. powders with sterile liquid paraffin upto 7% and used them in their experiments on dogs.

As vegetable oils are as good as aliphatic petroleum products in their dissolving capacities, oily dressings can be made use of owing to the easy availability of vegetable oils. This can be used in small animal practice. Even taking the possibility of absorption of D.D.T. in this medium, it can be used with care upto a safe limit. But olive oil seems to be the most fatal of all the medium of oils.

Ointments:—Govinda Rau et al (1947) made use of ointments prepared with vaseline as base upto a concentration of 4%. But the absorption of D.D.T. in fatty medium will have to be considered.

In Soaps:—D.D.T. at a concentration of 0.05 to 0.07% is incorporated in soaps and the same is now being used in a limited scale on small animals and success claimed. Even though D.D.T. is harmless in the percentage incorporated in the fatty medium, how far it can retain its toxic property in the combination of the alkali utilised in soap manufacture is yet to be ascertained.

But Hymas et al (1945) reported the efficacy of D.D.T. in soap and on chemical analysis recorded a deposit of 0.05—0.07% on the hair.

Powders :—Dusting powders are prepared by the incorporation of some inert diluent powders as talc, starch, kaolin, prophyllite etc. Fine road dust and condemned flour can also be used. 5% as well as 10% D.D.T. powders containing 5 or 10% D.D.T. and 95 or 90 per cent inert diluent are readily available for use, against ectoparasites of small domestic animals. Addition of calcium stearate and magnesium carbonate facilitates easy grinding and markedly improves the dusting property.

In Paints :—It has also been incorporated in furniture polish and oil paints. In enamel paints and varnishes also it is effective.

Good results are given by white wash containing D.D.T. But lime white wash with D.D.T. cannot be used as D.D.T. is converted into the non-toxic dehydrochloride.

Aerosols :—These are put up from solutions of D.D.T. by fine atomisation of solutions or by dispersion of D.D.T. by means of a burning mixture. In the former D.D.T. dissolved in a mixture of nonvolatile solvent and low boiling solvent is allowed to escape into the atmosphere under the pressure of the low boiling solvent which evaporates instantaneously leaving a very fine mist of D.D.T. in the non-volatile solvent. The latter termed "smoke aerosol" appears to consist of liquid droplets of supercooled D.D.T.

Aerosols are recommended for treatment of places which are difficult to be treated by other spray methods but no residual effects can be expected. They are insecticidally efficient at air concentrations of 0.004 to 0.007 mg. D.D.T. per litre. There is enough safety margin in its use as 3000 to 4000 times more than this concentration will have to be used to produce intoxication in animals. Neal (1944) is of opinion that the use of 1% deobase mist and 1 to 5% solution of D.D.T. with cyclohexanone and freon as aerosol are safe insecticides without ill effects to man and animals.

Of all the preparations available the aqueous suspensions and dusts constitute the safest products in Veterinary use. The use of even the harmless dust in cats should be cautioned because of their licking habits and marked susceptibility. The use of other preparations in food producing animals, pet ones and milk cows should be of a cautious nature because of its accumulation in adipose tissue and its concentration in the cream and butter.

Modes of Application :—Liquid forms of D.D.T. are utilised in different ways. 5% D.D.T. solution in kerosene has been widely used for attack on mosquitoes over wide areas of tropical forests and swamps by means of aircraft spray. When sprayed in this manner insects in flight get the intoxication besides the subjected areas remaining toxic for various periods killing the

existing susceptible larvae and adults. The common breeding places of insects as well as walls and other frequented places of insect pests can also be sprayed. Emulsions and aqueous suspensions can also be used in the same manner, besides their use on the bodies of animals. Surfaces should not be made wet with spray but merely moistened. For effective spraying various kinds of appliances are in use. For all practical purposes a 'flit-gun' pump spray will suffice. The Malaria Institute hand sprayer developed in India ensures efficient spraying. Stirrup pumps, Knapsack sprayers and power sprayers can also be used.

When large number of animals are to be treated with D.D.T. instead of spraying, dipping can with advantage be adopted. But Radeleff (1947) is of the opinion that the time honoured dipping vat is rapidly losing popularity to portable powered spraying units which enable the animals to be treated at their places rapidly and without much disturbance.

Small animals as well as isolated areas in large animals can be treated with the liquid preparations of D.D.T. by sponges or smooth brushes. Oily dressings can also be utilised in the same manner or rubbed by hand. Ointments can be applied by rubbing with hand taking necessary precautions.

D.D.T. powder is sprayed by means of dust guns and the common preparations of D.D.T. powders are usually sold in containers having the facilities for direct dusting.

TOXICOLOGY

Effect on Laboratory animals:—Experiments on laboratory animals reveal that rats have the greatest susceptibility, guinea pigs the least with mice and rabbits intermediate in increasing order of resistance.

Smith and Stohlman (1944) studied the toxicological problems in laboratory animals by giving D.D.T. in olive oil orally. The lethal dose 50 according to these workers for rats is 150 mg/kg body weight or (1 gm/lb), for rabbits it is 300 mg/kg (2 gm/lb); death was delayed for several days. But the experiments of Woodard et al (1944) showed the L.D. 50 as 200 for rats, 400 or over for rabbits, mice 400—500 and guinea pigs 250 to 600 mg/kg body weight. These workers found that D.D.T. dispersed in gum acacia was decidedly less toxic than in oil solution. Cameron and Burgess (1945) by administering D.D.T. in liquid paraffin arrived at the L.D. 50 figures as rabbits 300, guinea pigs 400 and rats 800 mg/kg body weight.

Draize et al (1944) noted that D.D.T. powders when applied to the skin produced no evidence of systemic toxicity or of primary irritation. Even 4 gms/kg of the undiluted drug had no effect on rabbits when applied externally. But in solutions D.D.T. is absorbed by both intact and abraded skin and causes severe poisoning. The experiments of Cameron and Burgess (1945) by the skin application of solutions gave the following L.D. 50 figures : rabbits 300,

guinea pigs 1000 and rats 3,000 mg/kg. Taylor (1945) dressed liberally rabbits young and old with 5% D.D.T. solution in acetone and found that a single application was fatal to rabbits. Even a single application of 0.5% D.D.T. solution in acetone to young rabbits was found injurious. But earlier to this experiment Elmes (1945) had successfully treated psoroptic mange in rabbits by a single application or in some cases by repeated dressings of 5% solution in acetone without any ill effects to rabbits.

Woodard et al's (1944) observation is that when injected intra-muscularly or intraperitoneally the drug is less toxic than when given by oral route. Calvery (1945) injected 150 mg D.D.T./kg body weight daily which caused death in rabbits, rats and guinea pigs after 30 days. The experiments of Cameron and Burgess (1945) give the following L.D. 50 for laboratory animals by subcutaneous injection of D.D.T. either in kerosene or ether : rabbits 250, guinea pigs 900 and rats 1500 mg/kg. The experiments of Konst and Plummer (1946) lead to the same aforesaid conclusions.

Smith and Stohlman (1944, 1945) also studied the cumulative effects by giving repeated small doses and found that 0.05% D.D.T. given daily for 3 months was injurious and 0.1% always killed the rats in 18 to 80 days; rabbits died in 15 to 25 days with a daily oral dose of 50 mg/kg in olive oil, after a total dose of 0.75 to 1.25 gm/kg. Woodard et al (1944) found definite signs of toxicity by levels in the diet of 0.05% in rats and mice and 0.1% in guinea pigs. Calvery (1945) corroborates the above observations in rats, rabbits and guinea pigs. Cameron and Burgess (1945) giving D.D.T. as 5% suspension in liquid paraffin to rabbits and rats with the daily dose of 50 mg/kg have obtained the same results. Other workers as Laug and Fitzhugh (1946) noted the toxic nature of the drug by giving rats 800 to 1,200 p.p.m. D.D.T. in their food for 6 months and less amounts for about 2 years. Solid D.D.T. is relatively non-toxic, some rats survive for a year the addition of 0.1% D.D.T. in their diet.

Absorption from the skin was also studied and the results show that D.D.T. is definitely toxic and sufficient is absorbed though not in the powder or in the aqueous form through the skin to cause toxic effects. Draize et al (1944) record the death of rabbits, rats and guinea pigs with doses as low as 0.5 c.c. of a 30% solution of D.D.T./kg/day. (150 mg/kg) after 30 days. Cameron and Burgess (1945) exposed the skin of laboratory animals repeatedly to 250 mg/kg in all forms of powder and found no toxic symptoms. The observations of Draize et al (1944) and others also confirm the above findings.

In inhalation studies of toxicity by Neal (1944) mice were found to be more susceptible than rats. Guinea pigs and rabbits were most resistant. Repeated exposures to heavy mists were without any effects. Small and young animals were more susceptible than large and older ones. The use of 1% D.D.T. deobase mist had no toxic effects on rabbits.

Effect on large domestic animals:—Konst and Plummer (1946) place chicken, cattle, goats and sheep in the increased order of resistance to D.D.T. Orr and Mott (1945) administered large amounts of D.D.T. as 100 mg/kg body weight daily for 3 weeks as a dry powder and in water suspension to cows, horses and sheep and found that the chemical did not produce toxic symptoms. Even a single dose of D.D.T. from 0.05 to 2 gm/kg body weight given to sheep did not result in any serious toxic symptoms. Nelson et al (1944) administered to cows, sheep and horses 100 to 200 mg/kg for 3 weeks and arrived at the same result as Orr and Mott (1945). The extensive use of D.D.T. on these animals so far has not resulted in any adverse effect.

Hitchcock and Mackerras (1947) administered orally 25 and 50 gm. doses of D.D.T. to cattle at repeated intervals without ill effects. 22.5 gm. D.D.T. in oil applied on the skin for 51 weeks, at weekly intervals also did not result in toxic symptoms. Telford and Guthrie (1946) observed that a single dose of 1.5 to 3.3 gm. D.D.T. /kg body weight to goats produced symptoms of toxicity but with ultimate recovery. Higher dosages resulted in deaths within 2 weeks. Goats fed with 0.25 to 0.28 gm/kg showed only the slightest manifestations of toxic symptoms. Goats sprayed daily for 42 days with 150 c.c. of 10% emulsion were not affected. Spicer et al (1947) are of the view that the single fatal oral dose of D.D.T. in vegetable oil for goats is greater than 1,000 mgm/kgm. Such repeated doses killed the goats after a total intake of about 6—11 gm/kgm body weight. Dove (1944) states that several hundred goats dipped in an emulsion containing D.D.T. has not resulted in any impairment of vision.

Effect on Cats:—Smith and Stohlman (1944) gave two cats 50 mg/kg daily or every second or third day and found them developing toxic symptoms and dying, after the intake of 500 mg/kg and 300 mg/kg in 12 to 15 days respectively. Another cat given four doses of 90 mg/kg died within 10 days. The L.D. 50 dosage for cats for a single dose is about 250 to 300 mg/kg which shows that the cat is one of the more susceptible animals. The licking habits of the cat is another factor to be considered when D.D.T. is used. King (1946) records a case of a cat immersed only once in a supposedly harmless dispersible powder of 0.5% suspension of D.D.T. which exhibited toxic symptoms within 12 hours. Helen Neve (1946) also narrates the development of toxic symptoms in a cat four hours after washing it with one part of a 0.5% suspension of D.D.T. in water with a little common soap as lather. Hamilton Kirk (1946) records cases including fatal ones of D.D.T. poisoning in cats even when they are dusted with the quite safe powder. The affected animals exhibited visible symptoms for several days upto more than a week before succumbing. Roberts et al (1947) record fatal cases of cats dipped in 1% aqueous suspension and those dipped in 0.5% suspension becoming sick. Morse (1947) record a mild case of poisoning following the application of 10% powder although the same observer had used D.D.T. on cats extensively with no toxic reactions. Sweetman (1946) noted no harmful effects in 2 cats treated with 50% dust; perhaps the cats were not allowed to lick.

Effect on dogs:—Draize et al's (1944) observation is that dogs are less susceptible to poisoning for cutaneously applied D.D.T. solution, and they are particularly resistant to D.D.T. aerosols. They tolerate comparatively large doses of D.D.T. by intranasal insufflation. But Vaz et al (1945) produced poisoning in dogs by daily doses of D.D.T. at the rate of 10 mg/kg body weight until intense symptoms of poisoning were noticed. Hamilton Kirk (1946) mentions of toxic symptoms in two cases of dogs which had several D.D.T. baths against ectoparasites. Hill and Robinson (1945) describe two fatal cases in dogs sprayed only once with a 5% D.D.T. in kerosene which were suffering from demodectic mange. Both died two months later.

Effect on Poultry:—Woodard et al's (1944) experiments gave the L.D. 50 doses of chicken as greater than 300 mg/kg. Definite signs of toxicity were produced by levels in the diet less than 0.05% in growing chicken and those fed with 0.05% D.D.T. in their ration died in 4 to 16 days. Kingscote and Jarvis (1946) observe that large quantities of 5 to 10% D.D.T. preparations ingested, inhaled or dusted on birds cause casualties. 1 gm of 75% D.D.T./lb. body wt. in oil orally caused severe symptoms of poisoning but adult birds recovered whereas young ones died of the chemical. Boxes painted with commercial D.D.T. are harmless for fowls. Usually young ones die without marked manifestations. Telford and Guthrie's (1946) experiments show that poultry tolerates a single dose of 0.5 gm/kg without any ill effects but all birds fed on a mash containing 0.1% D.D.T. die within 10 days, half of the birds dying without exhibiting any symptoms. Quigley and Cory (1946) found that oral administration of 200, 250, 300, 350, and 400 mg of D.D.T. in capsules to cockerels weighing 1,325 to 1,770 gms produce slight manifestation of toxic symptoms but no deaths, upto 15 days. Oral administration of 15 mg D.D.T. daily in capsules for 10, 20 and 30 days produce toxic effects only after 20 days but the same amount given daily in the mash for periods upto 120 days produce slight toxic effect for 48 hours only. Roberts et al (1947) encountered deaths in birds treated with 2% aqueous suspension; egg taint also was reported. D.D.T. as 20% dust or 1% emulsion applied to the eggs or 50% D.D.T. used in the incubator did not produce adverse effects on hatchability.

Effect on man:—"Workers in the laboratory, the field and the factory who have handled D.D.T. continuously in a variety of forms and often in large quantities have been submitted to detailed and regular clinical examinations by experts. Provided elementary precautions are observed, such as the wearing of protective clothing and gloves when handling concentrated solutions and dust masks when exposed to heavy concentrations, no cases of intoxication have resulted. Most medical specialists subscribe to the view that the danger from D.D.T. is no greater than from other insecticides."

Theresa Lazar (1946) reports the incident of one fellow officer who consumed, as the result of a bet, half a dozen pan cakes made of D.D.T. powder instead of flour. He enjoyed his meal greatly without any

untoward effects. Burn (1945) observes that the "experiments in volunteers show that the human skin is unharmed by the dry substance or by watery suspensions and one scientific worker took as much as 1.5 gm. of D.D.T. in butter without ill effects". Neal et al (1946) orally administered 770 mgs. of D.D.T. in olive oil corresponding to 11 mg. of D.D.T./kgm. body weight to one normal individual who tolerated it without any perceptible toxic effects. Experiments carried out by Cameron and Burgess (1945) using human volunteers led to similar results. Neal (1944) also observed that D.D.T. upto 10% in inert powders, offers no serious consequences. A clinical and laboratory study of 3 men who had several months of continuous occupational exposure to D.D.T. in its various forms as an insecticide, showed no definite toxic effects. The use of 1 to 5% solutions as aerosol should offer no serious hazards. Calvery (1945) is of the opinion that the safety level for man cannot be above 10 p.p.m. D.D.T. so extensively used on human beings either directly in the form of dust, or garments either dusted with D.D.T. or impregnated in D.D.T. solution to control louse infestation, have not so far been reported to have produced any harmful effects. "50 soldiers wore undergarments heavily impregnated with 1% wt. for wt. D.D.T. They exposed their bodies to 70—80 gm. of D.D.T. and had worn garments for from 4 to 6 weeks, with no harm. If D.D.T. with a bland fluid like paraffin is injected subcutaneously in large amounts, no toxicity results. The men who carried out impregnation of garments did not at all suffer except for a slight dermatitis in some of them which quickly disappeared. Yin-ch'ang chin and chi-hsueh T'ant (1946) describe the dressing of 32 students with different concentrations or mixtures of D.D.T. without any ill-effect as if with pain, heat and cold sensations. But the solution of D.D.T. in olive oil or mixture with vaseline has been found to desensitise the tactile sensations.

Wigglesworth (1945) reported the first case of presumed D.D.T. intoxication in a laboratory worker after a heavy and deliberate exposure of his hands to D.D.T. in acetone solution. Here the victim had been exposed to D.D.T. far in excess of levels that might reasonably be met with in the routine use of the insecticide. But Dangerfield (1946) narrates a different story. Exposure of the hands to D.D.T. in acetone was done by volunteers, though the duration and frequency of the exposures used, were probably greater than those of Wigglesworth's case. None of the volunteers suffered any irritating or toxic effects. Many other experiments in which moderate quantities of other preparations of D.D.T. were applied to the skin failed to produce toxic symptoms although in some cases irritation due to the vehicle resulted. Case (1945) narrates D.D.T. poisoning in two army personnel who were deliberately exposed for 48 hours with large skin areas in contact with the oily surface of the distemper containing 2% D.D.T. used on the wall of a room. Mackerras

and West (1946) report 4 cases of D.D.T. poisoning observed in New Guiana. The first two were the most severely affected of some 25 men who ate a tart in which D.D.T. was used by mistake for baking powder. The third case was in a man whose right hand had become covered with D.D.T. solution for six days of the week. The fourth man got D.D.T. powder in his eyes and became blind for a fortnight. All of them completely recovered.

Hill and Robinson (1945) record the first fatal case of D.D.T. poisoning in a child aged one year and seven months who swallowed about one ounce of D.D.T. in kerosene. The child died 4 hours after this. From this case, the above authors arrived at the figure of L.D. 50 for man as 150 mg/kg body weight. This figure indicates that the human subject is more sensitive to D.D.T. than the animal. Balban (1946) argues that the fatal case of poisoning recorded by Hill and Robinson might as easily be ascribed to the kerosene as to the D.D.T. since kerosene also is fatal, when taken internally. But Hill and Robinson fed a monkey with D.D.T. in kerosene and another with kerosene alone. The latter survived while the former died. This clearly showed that the cause of death in the child must be due to the D.D.T. and not kerosene. The same workers from their experiment found the L.D. 50 for monkey as 236 mg/kgm body wt. "A small group of men (natives of Okinawa) consuming American stores were accidentally and fatally poisoned by eating D.D.T. which they mistook for some edible material."

Symptoms:—"Symptoms following administration of D.D.T. are not unlike those of carbon tetrachloride poisoning." (Vaz et al, 1945) But Smith and Stohlman (1944) compare the symptoms of poisoning by D.D.T. with those of poisoning by phenol as observed in experimental animals except that the action of D.D.T. is delayed up to several hours and may persist for several days. With large single doses of D.D.T., however administered, the first signs of intoxication to D.D.T. generally occur in 12 to 24 hours. The symptoms of poisoning in laboratory animals are cold skin, sometimes diarrhoea, loss of appetite, hyperexcitability and sensitivity to stimuli. Dysfunction of the liver and kidneys may precede the onset of nervous manifestations. When tremors first appear, they are coarse in nature, involve the entire musculature and are particularly marked in the legs and in the muscles over the eyes; muscular weakness sets in especially the hind quarters; generalised fine and coarse tremors develop and movement becomes restricted and staggering which end in flaccid or spastic paralysis. Tonic or clonic convulsions precede death from respiratory paralysis. Anorexia leads to rapid loss of body weight and death usually occurs in 24 to 48 hours. A mild secondary anaemia, toxic in type and pronounced leucocytosis are quite common results.

Repeated small doses produce chronic poisoning by the cumulative effect. Those affected have anorexia, severe loss in weight, hyperexcitability, and nervous tremors leading to convulsions. Severely poisoned animals show a moderate leucocytosis with a marked increase in the percentage of heterophiles while emaciated animals are easily affected by secondary infections. The toxic symptoms will begin to decrease as soon as the D.D.T. is withheld. In slight intoxication, anorexia, muscular weakness and fine tremors are the poisonous symptoms. Reduced dosages result in anorexia, impairment of growth and mild anaemia with reduction in haemoglobin values, but without affecting white blood cell counts.

The symptoms observed by Orr and Mott (1945) in cows, horses and sheep are only marked loss of appetite. Nelson et al (1944) also agree with this besides describing slow tremors in the hind quarters of two cows. Telford and Guthrie (1945) observed in fatal cases of goats, tremors, convulsions, prostration and death within two weeks after a single dosage. Single lesser dosages resulted in tremors of varying severity with recovery. Single small dosage resulted in loss of condition and weight. Frequent administration of D.D.T. suppressed milk secretion, the lactation generally ceasing between 21st and 28th day of dosing. These observations are confirmed by Spicer et al (1947) and the manifestations of toxic symptoms usually appeared only after 12–24 hours. Cats show persistent extensor rigidity with muscular twitching especially of the head and neck which may persist for several days following a single dose. Hamilton Kirk (1946) describes the symptoms in the two fatal cases as nausea, hyperexcitability, tremors, extensor tetany, inability to stand and apparent great pain. The above symptoms were observed after several days. But Helen Neve (1946) and King (1946) observed the toxic symptoms within 12 hours, and in one as early as within 4 hours. The symptoms observed were generalised muscular tremors, tail erect and rigid, marked incoordination of limbs, rapid shaking of the head by spasms of neck muscles, continuous blinking of eye-lids and dilated pupils. The temperature was normal. General cutaneous muscular tremors, dilated pupils, wide and staring eyes, and 103.5°F. temperature were the symptoms noted by Morse (1947) in a mild case in a cat. Dogs become ill, lose appetite and die from exhaustion after exhibiting characteristic symptoms. The symptoms of poisoning in poultry are marked dyspnoea and tremors. Young ones die without marked manifestations.

The symptoms of the fatal case of human poisoning of Hill and Robinson (1945) are: within 10 minutes the child began to cough and vomit violently, his general condition worsened and after 1½ hours he became comatose had convulsions of generalised fine tremors and had froth in the mouth. The child died 4 hours after drinking of D.D.T. due to pulmonary oedema probably from paralysis of respiratory centre. The symptoms described by

Wigglesworth in his case of poisoning are: spasm of extreme nervous tension, prostration to such a degree as to confine the sufferer to bed for a fortnight and voluntary muscular twitching over the whole body on atleast 3 occasions. After 10 to 14 days the patient got up although the aching of limbs was severe. Full recovery had not taken place at the end of the year. The symptoms commenced 1 to 10 days after exposure. The observations made by Case (1945) in his experiments with human volunteers are: tiredness, heaviness and aching of limbs, diminution of some reflexes, unilateral slight impairment of heaving, muscular fibrillation, peripheral patchy anaesthesia, weakness of the legs and a curious apprehensive mental state. The symptoms began to appear from the third to fourth day and a return to normality took between 26 to 33 days. Haematological studies revealed an increase in erythrocytic destruction, a decrease in the mean corpuscular haemoglobin, an increase in reticulocytes, a slight fall in haemo-dynamic index and a diminution of neutrophiles accompanied by the appearance of immature white cells; Indoxyl-sulphate appeared in the urine.

Lesions:—Lillie and Smith (1944) who studied the pathology of experimental poisoning observed most striking changes in the liver. There was hyaline degeneration. In rats and rabbits, hyaline oxyphil masses were found in the central part of the cytoplasm and they were surrounded by vacuoles. There was also a variable amount of fatty degeneration of liver cells, often centrolobular. There was mid-zonal and centro lobular coagulation necrosis. Sometimes this was accompanied by interstitial and proliferative reaction leading to replacement by new vascular granulation tissue. This process when it was more extensive led to trabaculation. In rats and rabbits, there was focal hydropic degeneration of liver cells. In one rabbit, voluntary muscle necrosis with proliferative reaction was also seen. Nelson et al (1944) also observed the same lesions in their experiments. Besides they noted the thyroid often showing moderate depletion of colloid and less often epithelial desquamation and rarely epithelial hyperplasia. In rabbit, only a focal necrosis of gall bladder and increased incidence of nephritis were noted. Renal lesions were slight and infrequent. Myocardial and adrenal lesions were rare but these might be significant when they occur. There were no significant changes in the bone, bone marrow, testes, pancreas, and spleen.

In spite of the pronounced neurological symptoms produced by D.D.T. the histological changes in the C.N.S. are relatively slight. But Lillie and Smith (1944) observed in cats, rabbits and rats, vacuolation round the large nerve cells in the cord and cerebral motor nuclei and in cats and rats trigolysis and cell vacuolation. Nelson et al (1944) noted in rabbits only an increased incidence of spontaneous types of encephalitis, with no changes in the brain and spinal cord. Laug and Fitzhugh (1946) observed that the

weights of livers and kidneys of the animals receiving D.D.T. showed an average increase of 43% and 19% respectively and the oxygen consumption of the slices of liver tissue were about 40% below normal.

Lesions observed in large domestic animals are relatively slight. Haemorrhages are frequently produced in the sub-endocardium, in the left ventricle and in the lining of the intestines. Slight fatty degeneration of the liver is also present. Opacity of the cornea, contraction of the spleen, fatty changes in the heart and pericellular vacuolation of cerebral cortex, spinal cord etc. were the lesions observed in goats by Spicer et al (1947). Hill and Robinson (1945) noted in fatal cases of chronic poisoning of dogs centrolobular necrosis of liver and tubular degeneration of kidneys (both) with calcification. Konst and Plummer (1946) noted gross pathological changes in the liver only, after administration of large single doses of D.D.T. to birds. The most constant lesion was degeneration of liver of variable character but usually a vacuolar degeneration of the cytoplasm of the cells. Quigley and Cory (1946) noted in the autopsies of birds which did not die of administration of lesser doses of D.D.T. diffuse enteritis, slight necrotic patches in the crop, atony of the gizzard muscles, swelling and mottling of kidneys and some distension of uterus.

The lesions observed by Hill and Robinson (1945) in the fatal case of human poisoning was only pulmonary oedema.

Treatment.—The treatment of D.D.T. poisoning is purely symptomatic. If accidentally eaten, local measures can effectively be taken since absorption is slow. Stomach-wash, either with water or saline can be undertaken. Fat has to be eliminated from the diet for many days. Since liver is the organ usually affected, hepatic insufficiency can be treated by the intravenous administration of amino acid mixtures or protein hydrolysates. When nervous symptoms appear, the best antidote appears to be the administration of sedatives. Smith and Stohlman (1944) suggest that narcotics as cyclohexanone, in general may show a similar antagonism. The same workers (1945) noted good antidotal effects from urethane and to a lesser extent from dilantin. Phillips and Gilman (1946) tried C. N. S. depressants as therapeutic agents, the most outstanding being pheno-barbital which controls the characteristic tremors and convulsions in doses that caused a minimum degree of general C. N. S. depression. Vaz et al (1945) found that intravenous injection of 20 c.c. of 10% calcium borogluconate effected recovery in D.D.T. poisoned dogs in 2 to 3 hours, instead of 12 to 24 hours being necessary in the absence of treatment. Preliminary work by Kingscote and Jarvis (1946) indicated that calcium leoulinatate given intravenously arrested symptoms of acute D.D.T. poisoning. Further Vaz et al (1945) observed that injection of calcium gluconate for several days before administration of D.D.T. much reduced the severity of intoxication.

Elimination—Woodard et al (1945) record the storing of unchanged D.D.T. in quantities of significance in the body fat of dogs. Laug and Fitzhugh (1946) observed in groups of rats fed with D.D.T. upto 2 years, the drug in all tissues and the concentration in the peritoneal fat was about 50 to 100 times as great as in other tissues. D.D.T. content of tissues other than muscle appeared to be related to their fat contents. The exact amount of D.D.T. present in blood, liver, kidney, brain and spinal cord, bile and urine has been estimated by Smith and Stohlman (1944) and Spicer et al (1947). *The urianry excretion of D.D.T. is very slow.* Stohlman (1945) isolated crystalline D.D.T. and a water soluble fraction containing organic chlorine from the urine of rabbits which had been given D.D.T. by mouth. Smith and Stohlman (1945) demonstrated organic chlorine in the urine of rabbits, cats and dogs receiving D.D.T. long in advance of any recognisable symptoms of poisoning. Whit and Sweeney (1945) fed D.D.T. to rabbits which yielded di(p-chlorophenyl) acetic acid in the urine. Neal et al's experiments on man showed that part of the drug was metabolised to D.D.A. (di-(p-chlorophenyl) acetic acid) and eliminated in the urine up to the 10th day in the form of that metabolite but mainly from the second to the fourth day. Spicer et al (1947) also record the distribution of D.D.A. in the excvetary organs. So under biological conditions, hydrolysis of the CCl_3 group in D.D.T. can take place as shown by the isolation of D.D.A. (4,4. dichloro diphenyl acetic acid) from the urine of animals to which D.D.T. has been administered.

From 5 to 50% of the dose administered *is eliminated in the faeces.* Stohlman (1945) recovered crystals containing organic chlorine from the faeces.

D.D.T. is found to be eliminated in the milk also. The experiments of Telford and Guthrie (1945) are exhaustive in this problem. When 0.1% of this insecticide was fed in a balanced mash to adult rats each with one day litter, two of the nurslings died within 18 days showing toxic symptoms. Adult rats fed on milk from goats receiving daily oral doses of 1 gm. of D.D.T. per 8 or 9 lb. body wt. died within 2 to 29 days exhibiting typical symptoms of D.D.T. poisoning. Toxic goats' milk fed to recently parturient rats produced symptoms both in the mothers and nurslings. A half grown kitten given milk from a goat under treatment for 25 days died with typical D.D.T. symptoms within 3 days. There is evidence to show that the toxic principle of D.D.T. is concentrated in the fat globules of milk because butter prepared from the milk of treated goats produced typical tremors in rats within 24 hours of their being fed with this butter. Milk became more toxic after an extended period of treatment. But an unweaned kid allowed to suckle *ad libitum* a goat under treatment for 27 days showed no harmful effects. A goat was daily sprayed with 150 c.c.

of a 10% D.D.T. emulsion but the milk from this animal produced no toxic symptoms within 42 days when fed to rats nor within 76 days in a young kid allowed to suckle the sprayed animal. The same authors record later that a kid nursed by a milk goat receiving 1 gm. daily developed normally without symptoms of intoxication. Spicer et al (1947) confirm the above observations by their experiments. The milk of lactating dogs receiving D.D.T. contain appreciable levels of the compound. Woodard et al (1945) determined appreciable quantities of the drug in the milk of dogs receiving D.D.T. orally. All the laboratory raised flies exposed to milk and butter from the treated goats were down within $2\frac{1}{2}$ hours.

Uses of D.D.T. Against Arthropods of Veterinary Importance

D. D. T. is toxic to almost all arthropods. Insecta are more susceptible. The speed of kill varies with different insects; diptera are usually killed in a matter of minutes, anoplura takes several hours, while hemiptera and siphonaptera and acarida which are rather resistant may survive a day or two after contact. The report of U.S.D.A. says that 4% D.D.T. is effective against biting flies, lice and fleas. D.D.T. is not effective for screw worm flies, bot flies or other flies that visit the animal only momentarily to deposit eggs.

Diptera—Nematocera:—Extensive trials, field as well as laboratory have been underlaken in the control of mosquitoes and it is too much to cite the numerous references connected with this work. As mentioned already the demand of the fighting forces for an efficient insecticide to control the malaria carrying insects has resulted in the extensive use of this insecticide with spectacular results. The chemical is extremely effective as a mosquito larvicide and adulticide. Among the culicidae which are more susceptible than flies, *Aedes* alone stands the lethal dose of flies. The minimum lethal dose for the female *Aedes aegypti* is 2.4×10^{-11} grms. per insect. 5% D.D.T. solution in kerosene is the one commonly used. It is applied by spraying the walls, ceilings of rooms, cattle sheds etc., at the rate of 50 mgms/sq. ft. and this acts as a residual poison up to atleast eight weeks to mosquitoes. This works to about 1.25 c. c. of 5% solution per square foot. The mosquitoes can be completely eradicated with repeated sprayings at intervals of eight weeks. The mosquitoes alighting in the D.D.T. sprayed surfaces are poisoned and they eventually die. For direct attack on flying ones, aerosols and fine mists are used. But since residual action is desired, D. D. T. solution is used as a spray from the air at the rate of 0.2 lb. or 2 quarts of 5% solution in kerosene per acre. This is effective for 1 to 2 weeks. When sprayed from air, besides killing the flying ones, it attacks the breeding as well as the resting places and remains lethal for mosquitoes in such places and thus reduce the mosquito population. In the attack on culicidae, the treatment of water surfaces as the breeding places, is also

an important step. Small areas of water can be treated by ground spray at 1 to 2 quarts of 5% solution/acre. Aeroplane spraying at the same rate is very successful in the treatment of large areas. Kerosene solution spreads very well and is an effective larvicide. But the residual effect on water is negligible and so the breeding places should be treated atleast every week. It is to be emphasised that the kerosene solution is injurious to fishes as well as to foliage. If they are valuable, the emulsion recommended by the Malaria Institute of India is a useful one. (Formula 1) Mosquitoes besides creating a great nuisance and causing painful bites are the intermediate hosts and vectors of parasitic and protozoon diseases of domestic animals. *Aedes* transmits *Plasmodium gallinaceum*—malaria of birds; *Culex* transmits *Borrelia gallinarum*—the spirochaete of fowls and *Anopheles* and the former two are the intermediate hosts of *Dirofilaria immitis*—the heart worm of dogs.

The experiments of Hertig and Fisher (1945) prove that D. D. T. is effective against sand flies—*Phlebotomus* and 5% kerosene solution is effective up to 24 days. Sand flies transmit cutaneous leishmaniasis in animals.

Fairchild and Barreda (1945) record the complete eradication of *Simulium* larvae in streams by concentrations of 1 part D.D.T. to 10 million parts of water. Garham and McMahon (1947) eliminated *Simulium neavei* by the periodical application of D.D.T. emulsion to all infested rivers and streams in the locality. *Simulium* causes great annoyance and irritation and keeps cattle from grazing since it bites on legs, abdomen or on the head and ears. These bites which give rise to vesicles, if on the teats are troublesome in milking animals. Besides attacking fowls and making them anaemic from loss of blood, certain species transmit *Leucocytozoon*. It transmits *Onchocerca* also.

Brachycera:—D.D.T. is not definitely effective against *Tabanidae* and no treatment gives any marked reduction in numbers of flies. Since these flies act as mechanical carriers of surra in domestic animals caused by *Trypanosoma evansi*, which is a serious problem in our country more extensive and sustained trials are needed to find out the efficacy of the chemical. Besides spraying or dipping animals with aqueous suspensions, walls and ceiling of stalls and the vegetations overhanging watery areas which are the breeding places should also be sprayed with kerosene solution.

Athericera:—D.D.T. is toxic to adult *Musca domestica*—house flies but not to the eggs, larvae or pupae. D.D.T. sprayed or painted on the walls of stalls, ceilings and furnitures at the rate of 50 to 100 mgm/sq.ft. kills all the flies that alight in those places up to a period of about 90 days. For direct action, D. D. T. is used in aerosols or fine sprays

The dose is the same as is applied in mosquito control from the air. 5% solution of D.D.T. in kerosene is the one commonly employed. Manure pits etc., which are the breeding places of house flies should be sprayed with 1% solution in kerosene. Young ones which emerge out will be killed and adult flies coming for oviposition will also be killed. Bruce and Blakeslee (1946) noted that spraying of cattle sheds with 2.5% emulsion or suspension gave not less than 35 days effective control of *Musca domestica*. Burn (1945) reports that 3% D.D.T. spray applied on windows, walls and lights effectively eliminates flies up to a period of 3 weeks. *Musca domestica* is the intermediate host for *Draschia megastoma* and *Habronema muscae*. It can carry anthrax and surra. Besides, eggs of parasites can also be transmitted by it. The house fly may play an important part in dissemination of *Echinococcus granulosus*. Hence the importance of D.D.T. in the effective control of house fly breeding.

The adult flies of the sub-family calliphorinae as *Chrysomia*, *Lucilia* and *Calliphora* are also very susceptible to D.D.T. as a residual film. *Sarcophaga* also should have the same susceptibility. Matthysse (1946) observed screw worm infestation of wounds in cattle caused by *Chrysomia* was reduced by the inclusion of 8% D.D.T. though it could not be completely controlled since the fly visits only momentarily to lay eggs. *Calliphorine myiasis* in sheep is a serious and vital problem in wool producing countries and experiments in the control of calliphorine myiasis by D.D.T. have resulted in much sustained work in those countries. Cragg (1945, 1947) observed toxic symptoms in *Lucilia sericata* by 30 minutes contact with the treated fleece. Besides, some larvicidal properties of D.D.T. against blow-flies were also observed. Sheep, dipped in a bath concentration containing 0.5% D.D.T. were not struck even 44 days after dipping. Adult flies seeking D.D.T. treated fleece to lay eggs subsequently died. The above results are corroborated by Lyle-stewart (1946), Hughes et al (1946, 1947) and the report of the Council of Scientific and Industrial Research of Australia (1945). Harbour and Watt (1945) advocate spraying sheep as this method of control is easy to apply and more economical than dipping as the amount of D.D.T. used in the spray is less. The experiments show that though D.D.T. dips or sprays give good results, that alone cannot be relied as the sole measure of control since a few treated sheep are also struck. The observation of Cragg (1947) that D.D.T. has some larvicidal action is in variance with the report of the Council of Scientific and Industrial Research of Australia (1945) wherein it is stated that fully grown larvae of *Lucilia* were unaffected by D.D.T. The studies by Waterhouse (1947) on D.D.T. against *Lucilia cuprina* are exhaustive and worth going through.

D.D.T. is effective in the control of *Stomoxys calcitrans*-stable flies in 2% concentrations. Investigations of Abrahamse (1944) showed that D.D.T. killed *Stomoxys calcitrans* and was capable of maintaining stalls fly-free for

23 days and reducing fly numbers for 2 months. Bruce and Blakeslee (1946) found that cattle were protected for atleast 2 weeks from *Stomoxys calcitrans* by dipping in 2% emulsion and by spraying the resting places of flies. D.D.T. as a spray or dip either with emulsion or aqueous suspension on animals is only effective for a few days that is for about 2 weeks. 2% D.D.T. solution in kerosene applied to the wall of horse-barns gave 100% kill of stable flies for about 12 days. Effective control of the fly breeding places in manure was achieved by Blakeslee (1945) by sprays containing 0.5% D.D.T. or 2.5% D.D.T. in residual oil applied at the rate of 2 gallons/100 sq. ft. which caused 90-95% mortality of the emerging adult *Stomoxys calcitrans* though the drug was not effective against larvae. *Stomoxys* is known to act as intermediate host of *Habronema microstoma* and *Setaria cervi*. It has also been proved that this fly can act as a mechanical vector of surra and anthrax.

Since *Lyperosia* are almost always on the body of the animals, they are unaffected by the treatment of walls etc. So spraying or dipping of the animals either with aqueous suspensions or emulsions are the best modes of control. Bruce and Blakeslee (1946) record that spraying cattle with 2.5% emulsion at the rate of 1 pint per animal is effective and keeps down population of *Lyperosia* for about 50 days. This gives better results than dipping in 0.2% emulsion. Legg (1945) reports that with 4% D.D.T. in kerosene sprayed on the skin, herds can be kept practically free for periods of 2 to 3 weeks. Actually only one week after treatment, the animals are free from these flies. The toxicity of D.D.T. to both the buffalo and horn flies—*L. irritans* and *L. exigua* has been demonstrated by many other workers, as Legg (1947), Mackerras (1947) and Peairs (1946). These flies do not transmit any disease but keep the animals from grazing or feeding thus causing loss of condition.

Du Toit and Kluge (1947) who conducted a series of experiments with D.D.T. against *Glossina*—Tsetse flies observe that although total elimination has not been achieved, fly incidence has been reduced to a low level which may lead to complete elimination.

D.D.T. is not effective against *Oestridae* since they visit the animals only momentarily to deposit eggs. Matthysee (1945) sprayed legs and underside of cattle with D.D.T. preparations in concentrations of 2-5% which gave no protection against oviposition by *Hypoderma* flies and subsequent penetration of larvae. Telford and Harwood (1945) noted that oral administration of D.D.T. failed to remove the bots-larvae of *Gastrophilus intestinalis* from a horse. Salces and Calvo (1945) found that 5% D.D.T. on nasal mucosa was ineffective against *Oestrus ovis*. But in the fly season the resting places can be sprayed and direct sprays also can be attempted.

Pupipara can be eliminated by treating the hosts only since the flies are blood sucking ones and are found invariably on the bodies of their hosts. No treatment of stalls or of pigeon houses is necessary. Heath (1945, 1946)

dipped sheep in a bath concentration of 0.5% D.D.T. for thirty seconds which rendered the fleece lethal to *Melophagus ovinus* for not less than 36 days. Dipping 3 times a year in 0.5% D.D.T. keeps the fleece perpetually toxic to keds. 0.125% D.D.T. renders fleece toxic to keds for a considerable time. Since the keds cannot live off the host for more than about 10 days, a single dipping in 0.125% concentration is adequate for isolated flocks of sheep. With dipping in 0.5% concentration the protection is definitely for 54 days which may go up from 74 to 99 days. Rude and Parish (1945) found that sheep and goats dipped in 0.2% concentration remained free from keds for 90 days. Cobbett and Smith (1945) found that D.D.T. in aqueous suspension of 0.1% is effective up to 3 months and even 1% suspension is harmless to sheep. Kemper et al (1947) found that 0.2% D.D.T. used as emulsions or aqueous suspensions could eradicate sheep ked. Emulsions containing 0.15% D.D.T. or less failed to eradicate the infestation. The report of the Council of Scientific and Industrial Research, Australia (1945) also confirms the highly toxic action of D.D.T. against *Melophagus ovinus*. 1:5000 D.D.T. emulsion kills all keds in a few hours and over 4 weeks elapse before reinfestation can be detected. It is only Matthyse (1945) who found that 5% Neocid dust was ineffective since only 7% of the keds died. *Melophagus ovinus* stains the fleece by its faeces which lowers the value of wool clip. The ked transmits *Trypanosoma melophagium*, a harmless blood parasite of sheep. It produces intense irritation and sucks blood thus reducing the condition of sheep and even causes anaemia. Pigeons can be dusted with a 10% D.D.T. powder to eliminate *Pseudolynchia maura* which transmits *Haemoproteus columbae*. Cattle also can be sprayed with aqueous suspensions of D.D.T. to eliminate *Hippobosca maculata* which transmits *Trypanosoma theileri*. Besides it causes intense irritation to the host and is the mechanical carrier of anthrax.

Spraying of cattle is more economical and practicable than dipping though a bit less effective. But sheep can be dipped with advantage. It is always advisable to use aqueous suspensions and emulsions on animals and solutions in kerosene on the walls and other places. 4-5% D.D.T. is effective against most of the flies which die in about 15 to 30 minutes and remain lethal for about 1-3 weeks. Brett and Fenton (1946) are of the opinion that the period of control is extended with decrease in temperature. D.D.T. sprays to control flies need not be applied to extensive areas. The resting places of the flies alone need be sprayed. The duration of control is dependant upon the concentration of D.D.T. used. But D.D.T. alone cannot be employed to control flies. The proper disposal of manure and other accessory factors will also have to be attended to carefully. So, for the complete eradication, the breeding places as manure pits will have to be sprayed with D.D.T. solution in kerosene. Though it is not a larvicide, it is lethal to the flies alighting for oviposition as well as to the newly emerging ones from the pupae. The principles observed in the use of D.D.T. as enunciated by Craufurd Bensen (1945) are (1) The object of residual spray is to

reduce the fly population and not to kill individual insects. (2) It is an insecticide and not a repellent (3) The length of persistent action depends, on the amount of D.D.T. applied, age of residual film and the duration of contact of the fly with the treated surface. Wolfenbarger and Hoffman (1944) observe that spraying poultry houses with a 2% D.D.T. solution in kerosene reduces the number of flies very considerably and the effect remains for at least 6 weeks. Spraying poultry manure with solutions of D.D.T. reduces the population of fly larvae in the manure by 90%. When the flies come in contact with D.D.T. they become intoxicated, show development of nervous phenomena as violent shivers and ultimately die in 30 minutes or more with the appendages extended. In some cases the insects show signs of progressive laziness and paralysis indicated by jerky, staggering movements and inability to have a firm hold on any object. As the paralysis increases the mouth parts are also affected with inability to feed and ultimately they die of starvation. Hartzell (1945) studied the histopathological preparations of nerve and muscle tissues of adult flies sprayed with D.D.T. It caused slight dissolution of the fibre tracts and degeneration of nuclei both in the brain and in the fused thoracic ganglia but histological changes were relatively slight. The muscles of the fly showed the nuclei clumped into rod-like dense masses due to the clustering of the chromatin.

Hemiptera :—D.D.T. is very effective against *Cimex lectularius*-bed bugs. Madden et al (1944, 1945) got good results with D.D.T. solutions and dusts against bed bugs 100–150 mgm/sq. ft gives a toxic surface for 10 weeks. Spray will ensure a longer residual effect than dusts which can be easily removed. 5% aqueous suspensions and 10% dusts can be used on beds and 5% kerosene solution can be sprayed on walls, crevices and other hiding places of bugs. Burn (1945) reported that 5% aqueous suspension killed all bugs and retained its effects up to 10 months and the bugs died within 48 hours. 3% D.D.T. in kerosene killed all bugs and showed no signs of reinfestation up to 2 months. The same are the observations of Anon (1945) Apart from being very annoying in human dwellings, *Cimex lectularius* is a common pest of poultry houses. Kulash (1947) completely removed them from poultry houses which had been heavily infested for 15 years and found difficult to exterminate, with one application of 5% D.D.T. in kerosene. This observation confirms the earlier work of Kulash and Maxwell (1945) who noted the residual effect up to two months. Quigley and Cory (1946) reported that bed bugs were easily destroyed in a laying house by a 5% emulsion. *Cimex lectularius* causes severe irritation and anaemia in poultry.

Siphonaptera : D.D.T. is undoubtedly toxic to all fleas, including the human flea-*Pulex irritans*. Lightly dusting the host with a 10% powder and spraying or dipping larger ones with 0.5% aqueous emulsion give prompt and complete control and freedom which may last for about 3–15 weeks. The infested buildings can be sprayed with a 5% kerosene solution which gives freedom from all fleas with protection from reinfestation for about a week or

more. When animals are treated against fleas, with D.D.T. on their bodies, the host animal may be driven into a frenzy of scratching caused by the stimulation of the fleas to increased activity. This subsides in a few hours after the fleas are killed. The fleas are killed within 2 hours. As early as 1943 an out-break of plague in Algiers was controlled by D.D.T. since this chemical was definitely lethal to the rat fleas-*Xenopsylla*. Davies (1945) found that the rat flea-*X-cheopis* was susceptible to D.D.T. and died in 24 hours. Madden et al (1944) report that 10 grm of a 4 to 5% dust has been found effective in eliminating the dog and cat flea-*C-enocephalus canis* and *C-felis* with protection from reinfestation lasting four to seven days. Hamilton Kirk (1946) used 0.5% suspension of D.D.T. upon several badly flea infested greyhounds with complete success. The dogs were merely sponged all over and allowed to run about until dry. He also mentions about another greyhound infested with fleas which resisted all other methods of elimination until D.D.T. suspension was used successfully. It is announced that a concentration of 0.05-0.07% D.D.T. in soap makes a dog bath that will keep off fleas and lice for several months. It not only kills the fleas and lice but also prevents reinfestation. Campbell et al (1945) agree with the above results and report about dogs free for 3 months. Roberts et al (1947) observed dogs remaining free of fleas for 2 weeks when treated with 0.5% suspension. One tea-spoonful of 10% powder is enough for a dog.

In view of their cleansing habits and high susceptibility, cats should not be treated too frequently or with excessive quantities of D.D.T. dusts. Kerr (1946) demonstrated the susceptibility of *C-felis*-cat flea to D.D.T. and the activity persisted for 2 days at 0.04 grm/sq. ft. He considered 5% dusts for skin application suitable. Besides, the susceptibility of flea larvae was also noticed. Since even 0.5% aqueous suspension was found to be toxic by Roberts et al (1947) it is advisable to use only the dry powders on them. Sweetman (1946) treated places infested with *C-felis* and *Trichodectes canis* with D.D.T. powder successfully. 10% dust was used on cats effectively. But treated cats allowed in untreated premises became reinfested in 3 days indicating a very short residual protection. The report of the Council of Scientific and Industrial Research of Australia (1945) describes the toxicity of D.D.T. to cat flea. D.D.T. in 0.01% concentration destroys newly hatched as well as fully grown flea larvae. Fowls also can be dusted safely with 10% powder to get rid off fleas-*Echidnophaga gallinacea*. Poultry houses can be sprayed either with kerosene solution or aqueous suspension. 2% spray protects the houses for 10 to 28 days. Roberts et al (1947) suggest dipping them in 0.5% aqueous suspension for control and eradication of fleas. The birds, by treatment of 0.1% aqueous suspension, are protected for several weeks.

The fleas are less permanent parasites on their hosts. They suck blood and produce very irritating bites. *C-canis* and *C-felis* are the intermediate hosts of *Dipylidium caninum*. Besides, the domestic animals are made restless.

Echidnophaga gallinacea kills quickly young birds and even adult ones may succumb to heavy infestations.

Anoplura:—The human body louse—*Pediculus humanus caporis* as the carrier of typhus was the main target of attack by D.D.T. which was amazingly effective and the control of the typhus epidemic in Naples with the use of D.D.T. is well known. D.D.T. was blown by a compressed gun, up the trousers, down the sleeves into collars, tucks and folds wherever lice might cling. If well dusted 10% powder of about 1½ oz. will protect the body against all lice for 4–5 weeks. Even the garments can be impregnated by immersing them in a 1–2% solution of D.D.T. dissolved in a volatile solvent. Thereafter they become toxic to lice and remain so for some weeks even after they have been washed. Even the clothing dusted with D.D.T. is lethal for lice for a month even after launderings, 2% emulsion can be used to eradicate the head lice—*Pediculus humanus capitus*. It is believed that D.D.T. is the best method to date, of treatment of head louse infestation. What has been said about the control of fleas in domestic animals can as well be repeated for the control of lice in the domestic animals. 0.5% solution spray or 0.75% solution dip or 10% dust kills all lice within 4 hours. Tests have shown that a light dusting of infested cattle with 10% D.D.T. will completely destroy the lice. Lyle and Strong (1945) used 10% D.D.T. with good results to completely control *Bovicola bovis* and *Linognathus vituli*. Munro and Knapp (1945) dusted cattle heavily infested with *B. bovis* and *Haemotopinus eurysternus* with 10% powder and found them eliminated within 24 hours.

Parish and Rude (1945) observed that *Bovicola caprae*, *B. hermsi* and *Linognathus stenopsis*, the 3 varieties of goat lice were killed by 0.2% emulsion and the goats were freed from the same. Dipped animals were free from reinfestation up to 6 months. *Linognathus africanus* and *L. ovillus*—the blue louse of sheep have been found susceptible to 0.25% spray. The report of the Council of Scientific and Industrial research of Australia (1945) says that adult *Bovicola ovis* are killed by a 1:2500 emulsion. A single application of D.D.T. spray or dip proves effective in ridding swine of heavy infestations of the lice—*Haemotopinus suis*. Kemper and Roberts (1946) record that pigs sprayed with 0.5% emulsion completely got rid off lice, but the larvae hatching from eggs were able to re-establish infection. But pigs dipped in 0.75% emulsion were freed completely of lice, the drug persisting sufficiently to kill all larvae on hatching. Wolfenbarger and Hoffman (1944) observe that dusting poultry with 4% D.D.T. controls the body louse and the shaft louse—*Menopon biseriatum* and *M. gallinae*. Warren (1945) recorded good effects with 10% dust but 3% D.D.T. did not protect reinfestation after 2–3 weeks. Quigley and Cory (1946) dusted laying birds with 2, 10, 20% D.D.T. Lice were removed completely within 48 hours and no reinfestation could be established within 30 days. Dusting litter was not so effective. The satisfactory method was to

dust the roosting birds with 20% D.D.T. twice at two weeks interval. Telford (1945) also observed that D.D.T. gave complete control of chicken louse. All lice and nits on horses were found to be killed within 2 days by D.D.T.

The reviewer dusted a bitch heavily infested with *Trichodectes canis* with 10% D.D.T. powder and found the experimental animal completely freed from lice next morning.

Lice cause intense irritation and loss of condition of the host. *Trichodectes canis* is the intermediate host for *Dipylidium caninum*. *Haematopinus suis* may spread swine fever.

Acarida:—Acarina vary in susceptibility to D. D. T. Among the results for acarina, there are conflicting opinions and claims; perhaps due to difference in dosage and mode of application.

Ticks:—D.D.T. is found definitely toxic to ticks. Sargent et al (1945) applied 200 c.c. of 5% kerosene solution to skins of calves and found that *Hyalomma mauritanicum* did not become attached to treated calf for seven days. Squibb (1945) sprayed 400 c.c. of D.D.T. and rotenone to cattle which killed *Boophilus annulatus* and *B. australis* (microplus). The same author (1946) recorded 85% mortality of ticks with D.D.T. alone. The report of the C.S.I.R. Australia (1945) mentions that 0.5-2% emulsions destroyed not only *Boophilus* but also the larvae and protected against reinfestation for 2-13½ days. 2% emulsion was highly efficient against all parasitic stages of ticks and protected against reinfestation for 12 days. Hitchcock and Mackerras (1947) found 0.5% D.D.T. effective against arsenic resistant ticks—*B. microplus*. Parish and Rude (1946) applied 0.5% emulsion to horses at the rate of 2 quarts to 2 gallons and eradicated the winter horse tick—*Dermacentor albopictus*. The average period of protection from reinfestation was 45 days. Legg (1947) observes that arsenic resistant cattle ticks can be controlled with 0.5% D.D.T. employed in a dipping vat. The same is the opinion of Mackerras (1947). Heath (1946) is of opinion that D.D.T. is only a moderate acaricide. Freshly attached females are killed and those attached since 4 or 5 days are unaffected. But 0.5% emulsion dip markedly reduces the infestation of sheep with *Ixodes ricinus*. Govinda Rau et al (1947) studied in a detailed manner the tickicidal action of D.D.T. against *Rhipicephalus sanguineus* in heavily infested dogs. They found that 2 oz. of 1 to 4% powder was lethal to ticks. The ticks began to show toxic signs in about 10-15 minutes. In about 6 days with 1% powder the heavily infested dogs were clean and the residual effect was noted for 17 days. Better results were observed with 2% powder and with 4% Neocid very few live ticks were seen after 21 hours and the residual effect was observed for 13 days. Sargent et al (1945) noted that the application of 180 c.c. of 5% D.D.T. in kerosene gave good results in dogs against dog ticks for 18 days. The observations of Govinda Rau et al (1947) are that 100-200 c.c. of 3-4% D.D.T. emulsion in kerosene is

effective and all the ticks die within 3 to 43 hours and the ticks are noticed to die in $1\frac{1}{2}$ hours itself. The residual effect persists for 13-17 days. 1-4% D.D.T. ointments are found effective and the residual effect lasts up to 13-17 days. 100-200 c.c. of oily dressings from 3-6% are also found effective. The above writers recommend 4% D.D.T. emulsion in kerosene oil which has the residual effect up to 2 weeks, in the eradication of dog ticks. Reedal and Smith (1944) used successfully 5% D.D.T. paste against Gulf coast tick-*Amblyomma maculatum* and Spinose ear tick-*Ornithodoros megnini*. The areas usually infested with *Ornithodoros* and the poultry houses infested with *Argas* can be dusted or sprayed either with 10% powder or 5% kerosene solution or any other emulsion. Poultry also have to be treated for *Argas*, since the adult feeds often on the blood of birds. Warren (1945) reports the residual effect of D.D.T. on birds to be about 2 to 3 weeks.

Ticks are irritating to their hosts and tick worry results in restlessness, and loss of condition. Some ticks even produce wounds on the skin. The female ones, larvae and nymphs ingest large amounts of blood and thus cause anaemia in their hosts. Besides, they transmit diseases of domestic animals. *Argas persicus* transmits *Borrelia gallinarum* and *Aegyptianella pullorum*. The other ticks transmit *Piroplasmosis*, *Hepatozoon canis* and *Rickettsia canis*.

Ticks are not as spectacularly affected by D.D.T. as it deals with flies. Though it is definitely lethal to ticks, it acts very slowly and ticks survive 1 to 4 days the action of D.D.T. The dosage of the insecticide required is also more. So to get an immediate effect, D.D.T. is incorporated with pyrethrum. This mixture combines the rapid knock down action of pyrethrum and the residual effect of D.D.T. So, this mixture is gaining popularity in the treatment of tick infestations. The signs of toxicity in the ticks observed by Govinda Rau et al (1947) are: the ticks show excitement, roam about leaving the host and later tremors, assume dorsal position—difficulty to resume the natural ventral position, incoordination of the distal limbs and paralysis.

Mites:—At present all the experiments reveal that D.D.T. is ineffective against mange mites although a few reports to the contrary have appeared. Buxton (1945) reported that D.D.T. had little effect on mites. In the discussion, Mellanby (1945) stated that D.D.T. is surprisingly ineffective against human scabies. The same is the observation of Hellier (1945) who showed by statistics that D.D.T. had no preventive action against acquirement of scabies since the same percentage were suffering that had been wearing impregnated shirts or had been using D.D.T. regularly and recently within 2 months as that of others who had not been treated with D.D.T. But Elmes (1945) reports the successful treatment of rabbits suffering from sarcoptic mange and psoroptic mange (*Notodres cuniculi* and *Psoroptes communis cuniculi*) with a single application of 5% D.D.T. solution in acetone. The rabbits were free from mites in 2 to 4 weeks time. Dead *Notodres* mites were seen after 2 weeks and even they disappeared after one more treatment. The rabbits were

clinically free from the disease after 4 weeks. Krebs (1946) reports that *Psoroptes cuniculi* are destroyed by a 5% solution with applications at 3 days interval. Single application protects the exposed ones from infection. Perhaps rabbits alone respond to the treatment by this insecticide. Moore (1946) treated a case of sarcoptic mange in a dog with D.D.T. powder and found that the powder failed to penetrate and so was not effective against *Sarcoptes*. Though the skin regains normality, since the mites are not destroyed, skin lesion again appears. Downing (1947) observed that D.D.T. dips afforded some protection against *Psoroptes* in sheep but the dips were relatively ineffective in curing active scab except at uneconomic concentrations. But penetrating solvents and vehicles which will not prove toxic as vaseline etc., can be incorporated and tried. The application of D.D.T. in penetrating mediums up to a safe level is worth trying in cases of demodectic mange. A U.S.D.A. report states that D.D.T. is ineffective for the control of poultry mites (presumably the red-mite-*Dermanyssus gallinae*). Schmid (1945) in his laboratory experiments found D.D.T. lethal to poultry mites and stated that practical effectiveness had also been proved. Povar (1946) observed that when the feathers containing the mites were dusted with 10% D.D.T. in vitro the mites died in 3 days. Even the newly formed larvae died after 10 days. But when the bird moderately infested with *Liponyssus sylviarum* was dusted with 10% powder, it was found that the mites were unaffected until 4 days which chose lightly dusted areas. The observation of Davies (1945) also confirms the view that the mites are unaffected by D.D.T. The above experiments clearly prove that D.D.T. is not reliable for the treatment and eradication of mites.

CONCLUSION

D.D.T. is an insecticide of great potentialities. Because of its exceptionable toxicity to arthropods with a long residual effect and its easy availability, it is a preferred weapon in the control of animal pests and insect borne diseases and thus becomes a valuable veterinary chemotherapeutic agent. With all the limitations and draw backs, there is a wide margin of safety in its use as an insecticide, provided proper precautions are taken. In the wake of the discovery of D.D.T. and its subsequent extensive use, many new synthetic insecticides have been evolved which also claim our attention since better effects are claimed for them.

Dichloro diphenyl dichloroethane, (D.D.D.) is reported to be one fourth toxic to warm blooded animals as is D.D.T. but more toxic on immediate contact to mosquito larvae and more persistent effect. It is also reported that by replacing the chlorine in the D.D.T. molecule with fluorine, its destructiveness to insects is increased greatly.

Benzene hexachloride is another, which promises to be of great value as an insecticide. It was discovered in 1825 by Michael Faraday. But the same was rediscovered during the researches for synthetic insecticides, independently

by Dupire in France and F.J.D. Thomas of Imperial Chemical Industries Ltd., of Britain in 1943. It is comparatively easy to make by the action of chlorine on benzene under the influence of ultraviolet light but chemically the product is a complex mixture of isomers. An isomer—"Gama isomer" of benzene hexachloride has marked insecticidal properties. I.C.I. has put in the market the compound 'Gammexane' which contains the Gama isomer with the proprietary name '666' derived from the chemical formula of benzene hexachloride $C_6H_6Cl_6$. It is said that it has 8 to 10 times the killing power of D.D.T. for arthropods but does not have long residual effect. Because of the slow action of D.D.T. against ticks and the doubtful action against mites, Gammexane gives promise of being the best of the acaricides yet discovered. But it is said that it has a strong musty smell and clings tenaciously to clothing.

A chlorinated hydrocarbon with the formula $C_{10}H_8Cl_8$ which has been introduced with the trade name Velsicol or Octo-klor with the proprietary number '1068' derived from the formula, is claimed to be even deadlier to some species of insects than D.D.T. Its residual effect is not so long lasting as D.D.T. but lasts longer than Gammexane.

"Dowklor" chlorodane is reported to be 10 times as toxic as D.D.T. and the residual effect persists several months.

NMRI 448, the insecticide of the Naval Medical Research Institute is reported to kill insects with residual effects up to 2 weeks. It does not irritate the skin.

Het hexaethyl tetraphosphate, a new insecticide brought out of Germany has the property of killing even D.D.T. resistant ones but it has no residual effect being decomposed rapidly.

Now the question may be raised about the position of the natural insecticides—Pyrethrum and derris which will be available in plenty to our country. It is an established fact that the knocking down action of pyrethrum is of spectacular rapidity not shared by any other insecticide including those above mentioned. But the oxidising power of them to non-insecticidal compounds is a handicap in their use. So when the natural insecticides are available, the popularity of D.D.T. or any other synthetic insecticide will not be lost whereas the natural insecticides can be incorporated in the synthetic ones to give an immediate effect thus raising the value of insecticides combining the rapid knock down and long residual effect.

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Bibliography :—"One cannot recall any scientific development not excepting sulpha drugs, penicillin or even the Atom bomb that has resulted in such a sustained flood of factual technical reporting as the discovery and research development of D.D.T." The reviewer during the course of about two years has gone through innumerable references and texts from these references have been freely used in the above article. Space does not permit to refer completely to all the references utilised but an attempt is made to note all the important references. The aim of this review is to bring together in a comprehensive brochure everything known about D.D.T. so as to be of use to the profession and the author will be more than satisfied if this object is achieved in some measure.

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MANUFACTURE OF AGAR-AGAR FROM SEA WEED, *GRACILARIA LICHENOIDES*.

By

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Introduction:—Agar-agar or the jelly like substance obtained when red coloured sea weed is extracted with boiling water has been long in use as an article of food in the Orient. The crude jelly is made palatable by the addition of milk, sugar and raisins. On the Coromandel coast in South East India the agar-agar jelly prepared from *Gracilaria lichenoides* is much relished. This sea weed, a Rhodophyceae, grows commonly along the east coast, especially in and around the Gulf of Mannar, near Pamban and the small islands nearby. The weed grows in shallow sea on coral rocks and during the North-East monsoon the rough sea pulls up the weed which along with a variety of other plants, is cast on the beach in heaps. It is then a laborious and costly task to separate the gracilaria from other weeds and hence it is useful only as manure. The weed is harvested when the sea is calm by picking out the individual *Gracilaria* clumps, the red weed being easily distinguishable from the green weeds in the shallow transparent sea.

The jelly is used as an article of food in other Oriental countries also, such as, Ceylon, Malaya Peninsula, Sumatra, Java, China and Japan.

Several species of sea weed are useful for preparation of agar-agar. Most of them belong to the red algae group. Of these probably the *Gelidium* species is the most common and is also said to yield a very high percentage of agar-agar of superior quality.

Property and Uses of agar-agar:—Agar-agar is marketed in the form of straws, flakes or powder. It is of very light to very deep straw colour depending upon its method of manufacture. A light colour is wrongly associated with greater purity. On the contrary, it is more probably due to the thoroughness with which the weed was bleached in the sun.

Agar-agar is a very light material. One to two per cent of it is added to water and heated. At about 60 to 65°C the agar is liquified and forms a highly colloidal, viscous, translucent liquid. At about 40°C it solidifies into a jelly. Well prepared and highly purified agar such as that produced for biological purposes is almost transparent. The jelly is hard enough to be cut with a knife and a slant prepared in a tube can be streaked with bacterial growth with a platinum needle or loop without damaging the surface of the jelly.

Agar-agar is also known as Japanese isinglass. It forms an excellent substrat for cultivation of micro-organisms especially bacteria fungi and actinomyces. The jelly lends itself to different methods of cultural technique since it is liquid

when hot and sets into a solid of the shape of the container when cooled. Hence, cultivation of micro-organisms is rendered extremely easy in Petri-dishes, test tubes, slants, rolled bottles etc. Various food materials required by the organisms can be incorporated in the agar-agar by merely dissolving or dispersing the food materials in the agar when in liquid state.

Agar-agar is also used in medicine, as a laxative and in industry as size substitute. By itself it is an article of diet and also used for giving body to soups, jellies ice cream etc.

Composition of Agar-agar:—The composition varies with the nature of the plant from which it is obtained. The important constituent is a galactan, first referred to by Payen (1) and cited by Fellers (9), as gelose to which he assigned the formula $C_6 H_{10} O_5$. Czapek (2) referred to by Waksman (3), concluded that 1/3rd of the agar consists of galactan and that pentosans are present but in small amounts. Agar-agar can be considered as a hemicellulose complex consisting largely of galactan with an admixture of some pentosans, uronic acid as well as certain inorganic salts (3). Newberg & Ohle (4) and Samec & Sajerie (5) cited by Heilbron (11), concluded that agar is essentially a sulphuric ester of gelose of the formula $(C_6 H_{10} O_5) 57 H_2 SO_4$. Fairbrother & Martin (6) considered that it consists principally of the Calcium salt of an acid sulphuric ester $(ROSO_3) 2Ca$. Tetsunosuke Yanagigawa (7, 14) compared agar obtained from six different varieties of sea weeds and found that the main organic constituent was galactose.

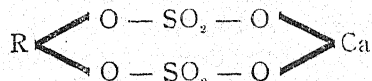
The complete analysis of agar by Forbes et al (8) and by Fellers (9) is given below:—

Constituents.	Per cent air dry material.	
	Forbes et. al. (1913)	Fellers. (1916)
Moisture.	15.29	16.57
Ash.	4.23	3.85
S	1.77	2.65
Ca.	0.66	0.92
Mg.	0.48	0.57
Na.	0.11	10.25
K.	0.11	0.07
Cl.	0.03	0.22
P.	0.02	0.05
N.	0.30	0.37
Fat.	0.37	0.30
Fibre.	0.89	0.80
N. free extract.	77.34	76.15

Robertson (10) states that the consensus of opinion identifies agar-agar as a galactan or a polysaccharide in whose molecule numerous galactose units are

united in a manner suggestive of the grouping of glucose nuclei in cellulose. A small proportion of other sugars complicates the situation so that agar reactions have not been uniform in all research laboratories.

Combined with the carbohydrate mass is a small proportion, usually nearly 3% of sulphur. This is apparently in the form of organic sulphate. Furthermore Calcium and magnesium form an essential part of the substance. Without these or similar bases the material is useless as a practical colloid. The firm bonding of all this material leads to the present assumption that the main carbohydrate molecular mass is combined as an ester with sulphuric acid. He has given the general formula, with only one of the two acid groups of



sulphuric acid esterified with the second free to form a calcium salt as follows :— He states that the actual chemical composition of agar-agar is still under research and controversy. However the main substances of composition may be taken as established. When the chemical structure of agar is known with certainty it may greatly help in the preparation and utilisation of agar-agar.

Process of Manufacture:—The basic principles underlying the process of manufacture of agar-agar from sea weed are practically the same in all the countries where it is manufactured, viz., Japan, United States of America, Australia and South Africa, though there may be alterations and differences in the application of these principles. These consist in:—

(1) Harvesting, washing and drying the material thoroughly after which it can be stored indefinitely.

Harvesting is done by hand all over the world as it is a practical impossibility to harvest the weed by existing machinery although, as stated by Robertson (loc. cit.), a great deal of mechanical ingenuity has been expended on the problem in United States of America. The rough seas beating over coral rocks, in 3 to 6 ft. depth of water, the rocky sea bottom on which the mass grows, and the luxuriant mass of various kinds of moss all growing together render the use of machinery an impossibility. Hence, harvesting is done by human labour, chiefly by fishermen who are adept at it.

Washing is done in sweet water if available or in sea water itself to remove, pebbles, shells, sand and other debris. This is only a preliminary washing to remove the more prominent foreign substances. The weed undergoes another and more thorough washing later on.

Drying is generally done on the sea shore the weed being hung up on frames. When dried to below 20% moisture, the weed keeps well. It is now baled and despatched to the factory.

The collection and supply of dry sea weed is in itself an industry in many coastal areas. Japanese manufacturers, however, employed their own harvesters and their ships carried the necessary personnel and machinery, visited coastal areas, in China Sea, Formosa, Indo-China, Malaya, Indonesian Islands, India, Ceylon and even as far as Eastern Australia, harvested the moss, dried and transported it to Japan for the manufacture of agar-agar.

The dried moss commands a fair price. Robertson (loc. cit.) quotes \$ 180.00 per ton in 1930 in Californian coast. In India, the moss had no sale before the war. In fact it was not an article of trade. However, in 1943 it was quoted at Rs. 30/- per cwt. at Kilakarai, near Ramnad.

(2) *Washing*:—The dried weed is again washed thoroughly in fresh water at the factory to remove the sea salts. It is generally found to be encrusted with lime in the Orient where it grows on coral rocks and when this is found to be so, the deposit is dissolved out first in 1% hydrochloric acid and later thoroughly washed in fresh water. The American weed seems to be free from such encrustations.

(3) *Bleaching*:—The cleaned weed is now sun bleached. This generally takes about two days. It is spread out in thin layer in the sun and sprayed with water, allowed to dry, sprayed again alternately for two days by which time it becomes deep cream or light straw coloured. The appearance of the final agar depends to a very large extent on the thoroughness with which bleaching is done.

Chlorine has been tried as a bleaching agent and Ferguson (13) among others, is of opinion that natural sun bleaching is the best as artificial bleaching, though effective, affects setting power.

(4) *Extraction*:—The bleached sea weed is now extracted with boiling water until the extract fails to jell on cooling. To obtain a concentrated extract three successive extractions are made, the last extract being used for the first extraction of the next batch. In some place e.g. Australia, (12) the first extract is set apart for manufacture of high grade agar.

The extraction may be effected in a modern factory with digesters and steam, Robertson (loc. cit.), or in a mud pot over a wood fire as in the Coromandel Coast in South India. However, the principle is the same in both cases.

(5) *Purifications*:—The hot extract may be treated with both charcoal and filter-cel as in United States of America and Australia or these treatments may be omitted as in Japan (10) and India (15, 16). The material congeals readily as a firm jelly at room temperature. It is then cut up into strips (U. S. A.) or extruded from a hand press, in a macaroni-like form, (Japan) placed in cans and frozen artificially in brine tanks as for ice production, (U. S. A., Australia and India) or naturally overnight in the open in Winter as in Japan. In the morning, the frozen mass may be cut up in small pieces or

thawed out as it is, taking care to keep the temperature low. The thawed liquor containing soluble material is allowed to run out, the jelly washed and dried either artificially or in the sun. The dried substance may be in the form of straws (Japan), flakes (U. S. A.) or ground into fine powder. The moisture is reduced to below 20% when it will keep indefinitely and is packed and marketed as Agar-agar.

Experimental:—When Japan entered the war a great world shortage of agar-agar was felt and in India this became a commodity of urgent necessity especially for the manufacture of cholera and other vaccines for the troops in Assam in Burma. Hence the immediate problem was (1) to search for and obtain an indigenous plant found in abundance and from which agar agar could be manufactured. *Gracilaria lichenoides* was found to answer the purpose in both respects. It is available in abundance on the Coromandel and Circar coasts, in Chilka lake and near Cape Comorin, and has been found to yield agar-agar of good quality.

(2) In a hot country like India, the cost of purification by freezing and thawing forms a considerable proportion of the manufacturing cost. Hence, a cheaper method of manufacture had to be found.

The methods tried were (a) Heat treatment: It was thought that some at least of the nitrogenous matter in the extract might be coagulated by heat and take down with it various impurities, which may then be filtered off as in the process of clarification with egg albumin. But it was seen that heat treatment did not effect this and had therefore to be abandoned.

(b) Water treatment:—

The method used was as follows: The weed was extracted with boiling water, without enrichment, thrice successively and all three extracts combined and poured in trays and cooled to jell. The jelly was cut up in very small pieces and placed in a tall cylinder and roughly two to three times its volume of water was added and the suspension left undisturbed for 48 hours. The water added was one of very low salt content, containing not more than 10 parts per one hundred thousand. At the end of 48 hours, it was seen that the water became yellow in colour, quite cloudy and emitted very foul odour. It was teeming with many varieties of bacteria, particularly a *Clostridium* type at the bottom and a long, thin rod, a *Bacillus* in the upper layers. There was a good growth of *Vorticella* on the surface. At the end of this period the excess water was removed and the jelly given a rapid wash with clear water and the steeping repeated for two further periods of 24 hour each. For the second and third steepings, inoculum consisting of the liquor from the first steeping was added which was roughly about 10% of the total volume of water added. The jelly was then thoroughly washed in several changes of clear water and finally dried in the sun. The agar-agar obtained by this method was in the shape of thin flakes of light cream colour. The flakes readily disperse in hot water

when desired for use. The agar goes into solution between 60 and 65°C and jelly is almost transparent and practically free from colour. The setting power of this substance was found to be very efficient, being only 1%. Analytical data of agar-agar prepared by this method, "Difco" brand agar, a standard product commonly used in biological laboratories as well as British Pharmacopoeia standards are given below, the last two for comparison.

Heads of Analysis	Average of Several Samples.				
	Our product.	Difco	Hopkins & Williams.	China grass.	B. P. Standards.
Moisture.	16.00	17.48	16.90	17.20	Not more than 18
Nitrogen.	0.17	0.22	0.37	3.83	
Ash.	3.60	3.00	4.02	4.13	Not more than 5
Setting power.	1.0	1.5	1.5 to	2.5	

The yield of agar-agar was about 20% of the weight of *Gracilaria lichenoides*. The agar-agar produced by this method, was tested along with other similar products available in the laboratory, for their usefulness as a substratum in culture media by plating different kinds of organisms and substances in Petri dishes. The number of organisms on each kind of agar was counted and compared. The results obtained are given below :—

Agar—agar.	Strength of agar—agar in media. %	Staphylococcus pyogenes.	B. Coli.	Milk.	Soils.		
					Tobacco Field.	Block III. A. R. S. Siruguppa.	Block VIII. A. R. S. Siruguppa.
Media.		Nutrient agar.	Bile salt agar.	Nutrient milk agar.	Sodium aluminate agar		
		millions.	millions.	thousands.	hundred thousands,		
Bacto agar							
"Difco"	2%	2,280	780	155	61	42	29
Chinagrass	5%	2,450	520	86	15	6	5
Our agar 1.	1%	2,220	840	134	50	52	29
2.	1.5%	2,170	880	144	39	21	16
3.	2%	2,150	760	139	78	39	10

Discussion:—The agar-agar obtained by this method compares favourably with that produced by the freezing and thawing method. The yield obtained is also comparable.

The method is simple and required no costly equipment or machinery. The only substance required for the process is water of low salt content which is obtainable in many places in the Presidency, as given below :—

The agar-agar thus prepared was tested for its utility as a substrat in a culture medium as compared with other kinds of agar agar commonly used in biological laboratories. The data presented elsewhere shows clearly that this product is as good as the other samples against which it was compared. Further, 1% of this agar was seen to give as firm a jelly as 2% and 5% of the other products which renders it proportionately cheaper.

Samples of the agar-agar were sent to various research officers and laboratories for favour of test as to their suitability as culture substrat. Their reports were as follows:—

(a) The Surgeon General with the Government of Madras, "the sample of agar agar.....was tested and found to be quite satisfactory for cultural purposes".

(b) King Institute, Guindy, "The test conducted shows that the agar is quite suitable for routine bacteriological use for growth and identification of organisms".

(c) The Veterinary Investigation Officer, Madras:—

"It is very pleasing to state that this is one of the best of agars that I have ever used in my experience of last 20 years in the laboratory. It sets rapidly with a lesser percentage and is very transparent. This transparency helps a great deal in studying minute colonies of organisms and at the same time helps in growing sensitive organisms".

(d) The Government Mycologist, Agricultural College & Research Institute, Coimbatore:—

"I have tested the sample of agar prepared in your laboratory. I find that with 1.5% of agar all the media tried solidified satisfactorily over a wide range of pH from 3.8 to 7.5. With 1% agar the setting was satisfactory at about pH 5 and 6 but not beyond. The performance of this agar was far better than 2% "Difco" agar".

(A short note on this subject had already appeared in "Current Science" April 1944, 13, 99.).

SUMMARY

1. Agar-agar of required purity for use for cultivation of micro organisms was prepared from the sea weed, *Gracilaria lichenoides*, a Rhodophyceae.
2. The purification was achieved by steeping the jelly in water of low salt content for about 96 hours.
3. This method is simple, cheap and efficient.
4. The agar-agar so prepared was analysed and found to conform to standards prescribed by British Pharmacopoeia, to compare favourably with agars commonly used in biological laboratories in point of purity as well as in

setting power than used as a substrat for a variety of media at different levels of pH.

5. Plate counts made with different organisms, milk and soil on different kinds of media prepared with this and other kinds of agar showed that the counts were comparable.

6. Samples of agar-agar prepared in this laboratory were tested by several research officers in the Province who were unanimous in their approval of it.

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Editorial

MIND THE CLINIC.

We draw the attention of our readers to an Editorial entitled "The Clinician is Important" in the *Veterinary Journal* of May 1947, which we have extracted below in this *Journal*. The article is a very opportune one and it is a timely reminder to the Veterinary profession, particularly in this country, which is in a very important stage of its development. As is well known, our profession in this land is still in its infant stage. It started to be organised less than 50 years ago, although the foundation had been well and truly laid earlier by well-known pioneers in the profession like Steel and Holmes, Gunn and Lease. They and their successors were all Clinicians of a very high order. They had not any of the modern equipment and aids for the diagnosis of the various maladies affecting the livestock, but that was no handicap to them; at least, that is what appears to us from a study of their writings and works. They must have been men of great skill and talent with acute powers of observation of animals, their habits and modes of living. It is this close knowledge of Animals and Nature that made these early workers such able practitioners and useful members of the profession and the country. A good bit of their observations and findings have stood the test of time and science and they are found to be as true today as they were then. Modern Veterinary Education has made vast extensive strides in many directions and the present day veterinary graduates of this country as well as of other countries possess such complete knowledge

of Veterinary Science that, in the matter of scientific equipment, they are in no way inferior to the members of the sister medical profession. To this extent, the progress has been highly satisfactory. But there appears to be danger ahead. As our contemporary remarks, there are many who think that the pendulum has swung too far and to the detriment of the clinical sense. It also opines that the same fears assail those in the sister profession. This is a warning which we in this country, especially those in charge of Veterinary Education, should take serious notice of in time. It should be borne in mind that, in this country, the modern aids for diagnosis—X-ray and microscopical examinations for instance,—are very scanty even among medical practitioners, and that, for all practical purposes, they are absent and non-existent for veterinary practitioners. While every endeavour must be made, and made with earnestness and energy, to get these equipments, it should be realised that it will be a long time before they could become actually available. Till then, the practitioner is necessarily thrown on his own resources. He has to use his own powers of observation and common sense to interpret the findings and arrive at a correct diagnosis. A study of a number of cases with a close and observant eye to the symptoms exhibited by the patients are very necessary for a true appreciation and understanding of the ailments of our animals. Errors in diagnosis can be avoided to a great extent if opportunities for post-mortems are fully availed of. Experience, of course, counts here as every where else and successful Clinicians are not made overnight. As the *Lancet* put it very correctly, 'To be a first class general practitioner is harder than to be a competent specialist.' If that is the case with regard to the human Doctors what should be the standard for Veterinary Practitioners dealing with dumb animals of varying species and kind? And, therefore, the 'Clinic' must form a special feature in all teaching institutions to which the teacher as well as the taught must give prominent attention.

THE CLINICIAN IS IMPORTANT*

If we study the history of the veterinary profession we find that from time to time there have been profound changes in outlook and endeavour. These changes have influenced greatly the line of employment and public relations. This is noticeable particularly if one considers the story of the last 150 years. Those who laid the foundations of the profession were mainly concerned with the welfare of the horse, and rightly so, for the economies of the world at peace or war depended upon that animal.

Other animals were not considered to be of sufficient merit to warrant the attention of the trained and skilled man. The cream of the profession certainly did not bother much about them and they were relegated to those who might be said to be "below the salt". Co-existent with progress in veterinary science, agriculture was also being re-orientated and established as a pursuit more and more dependant upon recognised scientific principles as against the hitherto rule-of-thumb or empirical systems.

As a direct result, attention was focussed upon the other animals of the farm until at the present time the bovine species have almost completely displaced the horse from his supreme position. Concurrently, small animal practice has developed in importance.

In the early days the surgeon was of necessity a skilled clinician who had to depend upon his own powers of observation and deduction. His clinical acumen and skill with his hands were his mainstays. In spite of these limitations, a great fount of knowledge was built up. Much of this information was set down and in no mean style, as those who are familiar with the literature of the nineteenth century can testify. Much of this material is as sound to-day as it was when it was written. The surgeons of those days had a profound knowledge of basic drugs, their compounding and action, and by their experimental methods of trial and error they laid the foundations of pharmacology. A successful man had to develop a good memory picture for cases; often his diagnosis was arrived at this means, for he had seen a similar case before. He had to develop an astute and logical mind, and train his hands and senses.

*Editorial *The Veterinary Journal*, May 1947,

As the years passed on, the pathologist and bacteriologist came to his aid, and many new discoveries were made. Some previously established beliefs were confounded, but on the other hand many received scientific confirmation.

Now we have got to the stage when we can also call on such people as radiologists, biochemists, etc. It is possible to get a specialist report on every aspect of a particular case, so that in many instances a diagnosis could be made without seeing the patient—in fact, a policeman could do the job.

No one will deny that it is perfectly correct to make full use of all possible aids to diagnosis, but there are many who think that the pendulum has swung too far and to the detriment of the clinical sense.

It is interesting to note that the same fears assail those in the sister profession.

There is no doubt that the modern young veterinary surgeon has a more complete academic knowledge of the animal body in health or disease, but there is also no doubt that as a clinician he compares unfavourably with his predecessors when the various aids to diagnosis are not forthcoming.

In the pharmacy he is at a disadvantage. In modern times we have learned to depend so much on proprietary drugs, many being of such a complex nature as to be beyond the ordinary individual's comprehension, that we have to take the maker's information for granted. The art of prescribing, compounding and dispensing basic B.P. products is in danger of being lost.

Veterinary medicine must be brought back from the laboratory to the stable and byre. The clinician is the most important man in the profession. If all the laboratories were closed, the profession would live. If the clinicians were removed, the profession would die.

It is to be hoped that when changes in the curriculum and examinations are being considered these points will be borne in mind, and that our teachers will ever remember that veterinary surgeons deal with living animals.

Clinical Articles

PENICILLIN THERAPY IN BOVINE MASTITIS*

BY

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I have selected for presenting to this Conference this subject of Penicillin Therapy in Bovine Mastitis, because, today, the control of this disease is a very important problem confronting the Veterinarian in the dairy and in the field, both from the economic point of view and the health of the nation at large. The use of many Chemotherapeutic drugs like Neutral Acriflavine 1 in 15,000, Silver Oxide, Phemerol 5% in oil, Sulphonamide in mineral oil, Reazol or (urea sulph-Benzol-Alcohol) and Iodine incorporated in mineral oil have been investigated in the treatment of Mastitis and today these are superceded by Penicillin which has proved to be of outstanding value.

During the past one year, I have tried Penicillin in the treatment of acute and chronic Mastitis, of both Strepto and Staphylococcal origin and this forms the subject of the paper.

Earlier reports of Penicillin in the treatment of Mastitis.

Several workers, have recorded the efficacy of Penicillin in the treatment of Mastitis. Kakavas¹ was the first to use it. The refractory cases of Mastitis that had become "drugfast" to Sulphonamides were first treated with Penicillin and the results were found encouraging. He reported very favourable results, when repeated infusions of low unitage of 5,000 units were made. He asserted that Sodium salt of Penicillin had not got unfavourable reactions manifested by the mammary gland. It had not produced any change in the character of milk and the milk secretion had not decreased during or after treatment. Further in his experiments, he observed that Staphylococcal infection was more resistant than streptococcal infection to Penicillin treatment. Bryan², Harwood and Huffman found Penicillin highly effective in the treatment of *Streptococcal agalactiae* infection of the bovine udder. As per their report, affected quarters of six cows were infused with 5,000 units of Penicillin and a single infusion had effected cure in four of them while, the remaining two required an additional infusion to eliminate the infection. In their further work, sixteen cows were infused with 12,500 units per quarter. Six of these recovered with one infusion, two required two infusions and one was given three infusions to effect a cure. They also recorded that Penicillin

* Read at the Annual General Body Meeting of the Madras Veterinary Assistant Surgeons' Service Association on 25th December 1947.

had no effect on Mastitis when administered by intravenous route. Animals suffering from chronic Mastitis were treated at various stages of the infection with infusion of Penicillin but the results were not encouraging.

Later, reports published by Murphy³ and Pfau⁴ indicated the value of Penicillin in the treatment of Mastitis and in their experiments larger doses and more intensive treatment than previously adopted were used in the eradication of infection from the udder. The following is the summary of their experiments:—

- Experiment (1). Fifteen quarters infused with 5,000—20,000 units of Penicillin in 50—300 c.c. of water. Five quarters were freed of infection.
- Experiment (2). Ten quarters were treated with five infusions of 10,000 units at 12 hourly intervals. Six quarters were freed from infection.
- Experiment (3). Thirty two quarters were treated with five infusions of 20,000 units at 12 hourly intervals—result 100% freed from infection.

According to the authors "The effectiveness of the treatment did not appear to be influenced by lactation period, duration of infection, degree of induration or degree of microscopic changes in the milk at the time of treatment".

In experiments conducted by Barker⁵, thirty-two infected quarters of fifteen lactating cows were infused with 25,000 units in 100 c.c. of water, and only 50% were freed from infection. Downham⁶ and Christie in their investigations with Penicillin in the treatment of Mastitis have reported that the best and satisfactory method of administration is to infuse 30,000 units of Penicillin on two occasions at intervals of 24 hours. Intermittent treatment was adopted with the same dosage except that it was repeated at 24 hour intervals on two successive days followed by a remission of treatment for two days in the case of chronic Streptococcal Mastitis. They are of opinion that Staphylococcal Mastitis would require a larger dosage of Penicillin for a successful control.

Frank Schofield⁶ demonstrated that the strength of Penicillin and the time of effective inhibition had direct relationship to each other. He stated that "in test tube, Penicillin in quantities as low as 0.2 unit per c.c. will inhibit growth; in mammary gland, quantities less than 0.5 unit per c.c. are of doubtful value". He showed also that inhibitory level of Penicillin, must be maintained in the udder at least for three days to get best results. He recommended a higher unitage such as 50,000 units per infusion for three successive days in near-dry lactating cows and 50,000 units every

12 hours for 3 days in the case of heavy milkers. This, as will be mentioned later on, was tried in our experiments.

Reports of Pullin⁷ show that 28 quarters infected with *Streptococcus Pyogenes*, 2 with *Streptococcus agalactiae*, 3 Streptococci unidentified of thirteen lactating cows were infused with 40,000 units in 100 c.c. of sterile saline for three days daily and 100% cure was effected with the first course in many and 2nd or 3rd course in the rest of them. Bryan⁸ reported on the use of Penicillin in Bovine Mastitis in the form of "mastic". The mastics were slender bougies 25 m.m. long, 4 m.m. in diameter and tapered at both ends. They are made of water soluble base and medicated with 3,000 units of Penicillin. They are designed partly enclosed in paper sheath which helps to handle and insert it into the teats aseptically without being touched by the fingers. The administration of bougie is as follows. After disinfecting the teat, the uncovered end of bougie is inserted into the teat orifice, passed gently along the teat canal and then, with further pressure, is passed through the sphincter and into the milk cistern of the udder. This method of administration it was stated would be of great value in the treatment of chronic Streptococcal Mastitis. In my opinion the disadvantage of this method would be the difficulty in passing the bougie in restive animals when there is every chance of the bougie breaking. Barnum⁹ who further worked on this method advocated that Penicillin bougie would be an easy and effective method of introducing Penicillin into the bovine udder, that no harmful effect had been noticed, that Penicillin would diffuse throughout the lactating gland and that the concentration of Penicillin in milk would compare favourably with the other methods of using Penicillin.

The reports of Murane¹⁰ show that three doses of 25,000 units of Penicillin in aqueous solution at 24 hours intervals proved very effective in the treatment of Streptococcal Mastitis and that the results were better than the oily suspensions of Penicillin and the concentration of Penicillin is effectively maintained for three days. Murphy¹¹ who used a combination of Sulphanilamide emulsion and staphylococcal toxoid, and Penicillin in the treatment of Mastitis, concluded that Penicillin is the best and most economical drug in streptococcal infection and in mixed infection of strepto and staphylococci.

Lastly, suspensions of Penicillin in mineral oil 1,000 units per c.c. have also been used by various investigators. The advantages claimed by this method are that a single infusion had a prolonged effect and that it was less irritating than aqueous or saline solutions. According to Plastringe¹², it was found to be very effective. Suspension of Penicillin in mineral oil is made as follows:—3 or 4 c.c. of sterile distilled water is added to the bottle containing the drug and when the powder is completely

dissolved the solution is transferred to another bottle containing a measured amount of oil.

Our Work.

With this review of investigations on the subject, I proceed to note my findings in this work. At the outset, it must be mentioned that, unlike in well organised dairies, the scope for the trial of the drug by me was restricted, because the treatment of the cases mostly depended on the co-operation of the clients who themselves had to supply Penicillin for treating their animals. Of the total number of cases of Mastitis admitted during the period from November 1946, when the treatment was first commenced to December 1947, about 90% of the cases were of staphylococcal Mastitis, and the remaining 10% were Streptococcal, mixed Strepto and Staphylococcal and Coliform infections. My trials with Penicillin in the treatment of Mastitis were based on the reports of other workers 1, 4, 6, and 11 viz. that infusions of the udder with Penicillin was the most effective method and that cases of staphylococcal infection required higher dosage for satisfactory results.

Methods of administration of Penicillin.

In my early trials, calcium salt of Penicillin (M & B) was used but from July 1947 Sodium salt of Penicillin became available for use. With both the salts the results were encouraging and there was no reactions in the mammary glands as a result of the Penicillin infusion.

Before using, Penicillin was dissolved in sterile distilled water or sterile normal saline which was kept at a temperature of 50°F. by keeping it in ice or in a refrigerator. One important point that has to be borne in mind is that the solution once made should be always kept at this temperature of 50°F. and it should be used before it is 60 hours old, as otherwise the solution becomes inert in a short time even when stored in the refrigerator. It is therefore necessary to make the solution just before use.

Technique adopted.

The following equipment is required.—

1. Penicillin phials.
2. 200 to 400 c.c. sterile normal saline solution.
3. Methylated spirit.
4. Four sterile test tubes for collecting samples of milk for laboratory examination.
5. 20 c.c. Record or Glass syringe.
6. Intravenous injection apparatus (rubber tubing with funnel) and
7. Four teat syphons and four hypodermic needles which will fit into the teat syphons.

With sterile precautions, a sample of milk from each quarter is milked into the sterile test tubes which are previous labelled with the details of the

case and then sent to the Laboratory for examination. The quarters are then completely stripped before the infusion is given.

After passing the teat syphon, the needles fitted to the needle adopter and the Pencillin solution is allowed to flow into the gland by gravitation. In cases of chronic Mastitis, Hobdays chloroform pump is fitted on to the mouth of the syringe and, then, the solution is forced into the gland. After infusion, the teat syphon with the needle is removed and the teat end is held by the thumb and finger to prevent the escape of the fluid; with the other hand, the fluid in the teat canal is drawn up into the milk cistern and then well massaged to help the penetration of Penicillin. This procedure is repeated for each of the affected quarters using fresh teat syphons and hypodermic needles.

This method of administration seems to be much easier and less troublesome, as compared with the technique adopted by other workers 5 and 11. They have set up their apparatus with a teat syphon which is fitted to a short piece of rubber tubing at the mount. One end of the tube fits into the mount of the teat syphon and the other, on the nozzle of 50 c.c. syringe. It may serve the purpose when the animal is not restive and also when the solution to be infused is only 50 c.c. In the case of restive animals and where 100 and 150 c.c. of solution is to be infused the method adopted here is safer and more effective; mishaps, such as breakage of syringe, wastage of solution etc., are avoided.

The interval between the successive infusions is 24 hours in the case of ordinary milk yielders and 12 hours, in high milk yielders. Intermittent interval of 4 to 8 days between two courses was found effective in two of the cows treated.

As a rule, after the completion of three infusions of Penicillin, a sample of milk was sent for bacteriological examination. If the infection was still present, further treatment with Penicillin was continued till a full course of six infusions was over. Before each infusion milk was sent for bacteriological examination and no animal was said to be cured until the examination of the milk was negative both clinically and culturally. However, it was not possible in all trials to see every case tested in the said manner. Schofield observed that check testing is of great value in the eradication of Mastitis. According to him the milk of the treated animals is to be examined bacteriologically every week for 3 months.

The details of the cases treated are given in the following tables.

TABLE I

Serial No.	Details of quarters affected	Nature of infection	Dosage and dilution of penicillin	Interval between Treatment	Number of infusions	Result after Treatment	REMARKS
1	All four quarters	Staphylococcal infection	40,000 units in 125 c.c of sterile Normal Saline	12 hours	Six infusions	Cured	Milk exam, 18/11/46 positive for Staphylococci, 19/11 (after infusions) positive, 21/11 (after 5 infusions) negative for staphylococcal organisms
2	Right fore quarter	Staphylococci	50,000 units of penicillin in 100 c.c. S. N. Saline	24 hours	Three infusions	Clinically cured	Milk exam, 21/11 positive for Staphylococci Milk treated by boiling was normal.
3	Left Hind quarter	Staphylococci	50,000 units in 100 c.c S. N. Saline	24 hours	Three infusions	Clinically cured	Milk exam. positive for Staphylococci (after 3 infusions) milk treated by boiling was normal for all appearances.
4	All four quarters	Staphylococci	50,000 units in 100 c.c. S. N. Saline	24 hours	Three infusions	Clinically cured	Milk exam. positive for Staphylococci (after 3 infusions) milk treated by boiling was normal for all appearances.
5	All four quarters	Staphylococci	50,000 units in 100 c.c S. N. Saline	24 hours	Four infusions	Cured	Milk exam. 11/1/47 Positive for Staphylococci, 25/1 negative for Staphylo organisms
6	Right Hind quarter	Staphylococci	50,000 units in 100 c.c S. N. Saline	24 hours	Four infusions	Cured	Milk exam. 26/1/47 revealed staphylococci 12/2/47 negative for organisms
7	All four quarters affected	Staphylococci	50,000 units in 100 c.c. S. N. Saline	24 hours	Three infusions	Cured	Milk exam, 12/6/47 revealed Staphylococci 18/6, 10/7 negative for the organisms

TABLE I (Continued)

Serial No.	Details of quarters affected	Nature of infection	Dosage and dilution of penicillin	Interval between Treatment	Number of infusion	Result after Treatment	REMARKS
8	Left fore quarter	Staphylococci	50,000 units in 100 c.c S. N. Saline	24 hours after 4 days	4 infusions	Cured	Milk exam. 10/7 positive Staphylococcal organisms 15/7 " " 17/7 " " 22/7 negative for organisms
9	All quarters except Right Hind quarter	Staphylococci	50,000 units in 100 c.c S. N. Saline	24 hours	3 infusions	Cured	Milk exam. 3/7/47 revealed Staphylococci " 8/7 " " 10/7 negative for organisms
10	Left fore quarter	Staphylococci aureus & albus	50,000 units in 100 c.c S. N. Saline	24 hours	3 infusions	Cured	Milk exam. 4/8/47 micros. Test + for Staphylococci " 6/8 organisms still present " 9/8 no organisms present
11	Left fore quarter	Staphylococci Reinfection Detected on 17/9/47	50,000 units in 150 c.c S. N. Saline	24 hours	5 infusions (1/9 to 5/9/47)	Cured	Milk exam. 31/8 revealed staphylococci 4/9 " " 5/9 " "
				24 hours	4 infusions (18/9 to 20/9)		11/9 microscopic Test negative for organisms but cultural positive 23/9 positive for staphylococci 25/9 and 8/11 negative for organisms
12	All four quarters	Staphylococci	50,000 units in 100 c.c S. N. Saline	24 hours	four infusions	Cured	Milk exam. 27/10 revealed staphylococci 31/10 negative for organisms 3/11 negative for organisms Milk secretion considerably reduced during and after treatment
13	Left Hind	Staphylococci	50,000 units in 125 c.c S. N. Saline	24 hours after 7 days	4 infusions	not Cured	Milk exam. 8/11 positive for staphylococci 14/11 " " 4/12 " "
14	Left Hind	Staphylococci	50,000 units in 125 c.c S. N. Saline	24 hours	4 infusions	Cured	Milk exam. 26/11 staphylococci 5/12 negative for organisms

TABLE II

Serial No.	Details of quarter affected	Nature of infection	Dosage and dilution of Penicillin	Interval between Treatment	Number of infusions	Result after Treatment	REMARKS
1	Right fore quarter	Mixed infection of strepto and Staphylococci	50,000 units in 150 c.c S. N. Saline	3 infusions 24 hours 5 infusions 12 hours	8 infusions	Cured	Milk exam. 16/11/46 positive for strepto and Staphylococci 18/11 20/11 Positive for Staphylococci only 21/11 Negative for both Milk normal for all appearances
2	Lift Hind quarter	Mixed infection of Strepto & Staphylococci	50,000 units in 100 c.c sterile S. N. Saline	24 hours	6 infusions after 2 days interval 5 infusions	Not Cured	Milk exam. 10/7 Positive for strepto and staphylococci 24/7 Later exam. of milk revealed the presence of organisms: clinically milk was not normal.
3	Right fore quarter	Mixed infection of Strepto and Staphylococci	50,000 units in 100 c.c S. N. Saline	24 hours	6 infusions	Cured	Milk exam. 8/9 revealed strepto staphylococci 5/9 negative for organisms
4	Left fore and Hind quarters	Mixed infection of Streptococci and Coliform bacteria	50,000 units in 100 c.c S. N. Saline	12 hours 24 hours	6 infusions 4 infusions	Not Cured	Milk exam. 21/11 revealed streptococci and Coliform bacteria Milk exam. thro' out treatment revealed the presence of these organisms.

TABLE III

1	Left fore quarter	Streptococci	50,000 units in 100 c.c S. N. Saline	24 hours	3 infusions	Clinically Cured	Milk exam. 13/2/47 revealed streptococci (after 3 infusions) milk was normal for all appearances.
2	Left fore quarter	Streptococci	50,000 units in 100 c.c S. N. Saline	12 hours 2 infusions 24 hours 3 infusions	5 infusions	Cured	Milk exam. 28/3/47 revealed streptococci " 31/3 negative for streptococci

It will be seen from the tabulations, that about 80% of the cases were cured with 50,000 unit dosage of Penicillin per quarter given successively at 24 hour intervals for 3 to 6 days. It is also found that 12 hour infusion of 50,000 units of Penicillin was not more effective than the 24 hour infusion.

In eradicating an early infection of Staphylococci, three infusions of 50,000 units of Penicillin in 100 c.c. were given and found effective. But in another cow, suffering from chronic Staphylococcal Mastitis, a course of four infusions of 50,000 units each was repeated twice with an interval of 7 days with no response to treatment, while in another case, six successive infusions at 24 hours interval have failed to give a cure. Thus, it is seen that staphylococci depending on the duration of infection are more resistant to Penicillin treatment. It is found that intermittent treatment failed to eradicate the infection in some of the cases. One of the cows suffering from mixed infection of coliform and streptococci infection did not respond to Penicillin treatment; it was also found that even the streptococci were not eradicated in the presence of coliform infection. This shows the inability of Penicillin to act on gram positive bacteria in the presence of gram negative organisms.

Cases of streptococcal infection were treated with 3 to 5 infusions of 50,000 units of Penicillin in 100 c.c. Two cases of mixed infection of strepto and staphylococci were also treated with Penicillin. It was found from the results of the bacteriological examination of milk that staphylococci are more resistant than streptococci to Penicillin treatment.

In some of the cases it was noticed that milk secretion was considerably reduced during treatment.

SUMMARY

1. All cases of Staphylococcal infection and mixed infection of strepto and staphylococci have been treated with Penicillin with udder infusion of 50,000 units in 100 c.c. of sterile normal saline given successively for 3 to 6 days at 24 hour interval.
2. 80% of the affected cows have been successfully treated.
3. It has been found that early affected cases of staphylococci may yield to a lesser number of infusions with the same dosage and interval.
4. Cases of streptococcal mastitis are given 3 to 5 infusions of 50,000 units of each to effect a cure.
5. In some, where continuous treatment fails intermittent treatment is found to be very effective.

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Sri M. N. Menon Lecturer in Surgery. I am grateful to my colleague D. Krishnamurthy for his valuable assistance in bacteriological examination of milk. Finally I am very grateful to the ex-Principal Dr. K. S. Nair and the present Principal Dr. G. R. Viswanathan for kindly permitting me to undertake this work and also for their valuable guidance from time to time.

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A HIDDEN DISEASE OF BOVINES IN SOUTH KANARA DISTRICT

By

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For the last few years an undiagnosed disease has been prevailing among bovines in South Kanara District and causing a fairly high mortality. White cattle and buffaloes are all susceptible, although the calves of the former do not appear to suffer to the same extent as the adult cattle. The disease is prevalent in hill side villages with paddy fields in between. During the year 1947, a number of villages in Buntwal sub-taluk was severely affected.

Geographical Position:—South Kanara District is interspersed, with hills and dales with extensive evergreen vegetations and perennial rivers. The whole district extends about 50—70 miles from the Western Ghats.

Elevation:—Several parts of the District range from sea level to 3000 feet above mean sea level.

Rainfall:—The average rainfall is 150 inches. Rains commence in June and continue till end of November.

Protozoan diseases:—Malaria among human beings and Trypanasomes and Piroplasms among bovines are common in the District.

Symptoms:—(As reported by Sri B. Narasinga Rai, Touring Veterinary Assistant Surgeon, Kasaragod):—

Weakness of hind quarters, animal refusing to walk, and, if forced to do so lying down, and slight rise of temperature in the initial stages. As disease advances constipation, impaction of rumen, tympanitis and oedema under the throat, slowly extending back.

Animals go on feeding till the last and die. Duration of the disease is 20—45 days. A few blood smears revealed T. Mutans and one Trypanosomes.

During the period of 1946-47, 270 attacks and 105 deaths were reported.

A specimen of straw was sent to the Agricultural Chemist. The result was "Nothing abnormal".

As reported by Sri V. Ravivarma Hegde, Touring Veterinary Assistant Surgeon, Coondapoor:—

White cattle are affected but buffaloes do not get the disease, young animals below one year do not appear to contract the disease. Animals develop weakness of hind quarters from the very beginning. There is profuse watering in the eyes. Stringy saliva through the mouth with foaming at the corners of the lips. The muzzle is dry and there is no discharge from the nostrils.

No tympany was observed. The outbreak does not spread like other diseases. It is confined to one shed; nearly 50% of the incontacts get the disease and die.

As observed by Sri Y. Shivappa Rai, Veterinary Assistant Surgeon in charge Veterinary Dispensary, Puttur:—

There is constipation, tympanitis, inability to move, and feeding till death. A few animals showed oedema of dewlap.

Post Mortem:—Apical lobes of both lungs were found consolidated and there was serous fluid in the cavity. 5-10% of the village cattle got affected. A few cases were treated with intravenous injections of N.A.B. (0.5 grams) in 20 c.c. of distilled water and recovered.

As reported by Lt. K. P. D. Nair, Veterinary Assistant Surgeon in charge Veterinary Hospital, Mangalore (Touring Veterinary Assistant Surgeon, Udupi):—

The disease appears after the rains and subsides with the onset of monsoon. Most of the outbreaks are from January to April.

Symptoms :—Impaction, Diarrhoea, weakness of hind quarters, debility, oedema under the dewlap, sternum and abdomen.

Cough or nasal discharge if present went unnoticed by owners. Treatment with N.A.B. disappointing.

Duration of disease :—1 to 2 months. Recovery rare.

Post Mortem findings :—4 to 5 pints of straw coloured fluid in the pleural cavity was found and this began to coagulate almost immediately though it did not form a complete block. 5 c.c. of this fluid was injected into an experimental calf (one year old) subcutis, and the calf did not show any reaction.

As observed by Sri B. Sanjeeva (Touring Veterinary Assistant Surgeon Karkal) :—

The outbreaks were confined to hilly areas, pyrexia and lung symptoms went unnoticed and not reported in any of the affected animals. Diarrhoea that was noticed in affected cases was due to the administration of country drugs by local quacks.

SURRA IN BOVINES—SOME UNCOMMON SYMPTOM*

By

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Surra and Anthrax among bovines are usually characterised by high temperature, colicky pains and convulsions, generally ending in death with bloody discharges from the natural orifices. Microscopical examination of the blood smears confirms the respective diseases.

Many practitioners might have observed in Bovine Surra, intermittent fever, depraved appetite, incoordination of movements of hind quarters, stiffness of limbs, muscular tremors, staring coat, frequent copious micturitions, impaired vision, dropping down with intermittent convulsions, and in later stages, decubitus, diarrhoea, emaciation and finally death. Symptoms of wry neck and high coloured urine have also been observed. The observation of the above clinical symptoms leads one to suspect Surra, though of course, confirmation must be sought by microscopical examination of the blood.

*Read at the Annual General Body Meeting of the Madras Veterinary Assistant Surgeons' Service Association on 25th December 1947.

In Africa, loss of brush and ulceration of tongue are said to be diagnostic features of Bovine Surra.

The following record of some uncommon symptoms observed by me in cases of Bovine Surra will be found interesting.

In a village near Manaparai, Trichinopoly District, heavy mortality in cattle were reported with symptoms of violent fits, muscular tremors and instantaneous death. Examination of blood smears revealed *Trypanosoma evansi*.

A bullock (a fast runner in cart) was reported to be having progressive lameness of the right fore. On examination, urticarial eruptions were observed on the right shoulder-blade. Out of curiosity, blood smears were taken, though there was no rise in temperature. On examination, *T. evansi* were found. The animal was then treated for Surra. The lameness and urticarial eruptions disappeared and the animal was alright in a fortnight.

A second bullock was reported as dull and disinclined to work and going dead lame on the right fore. The coat was staring and the temperature was 105°F. Blood smears were found positive for *Trypanosoma evansi*. The animal was treated for Surra and it recovered. This second case is likely to be mistaken for ephemeral fever. It is also possible that if 2 or 3 animals were to die in a village with such symptoms, the deaths are likely to be taken as Black-quarter by a field worker.

The third case was a cross-bred heifer-calf with the following symptoms:—dullness, anorexia, passing loose motions for a fortnight with occasional tympany of the abdomen, intermittent fever and a doughy swelling throughout the dewlap from the throat to the chest. The report of the examination of blood smears was 'heavy infestation of *T. evansi*'.

The fourth case was a Kangyam bullock. It was not ruminating from the previous evening, the temperature was 97°F, tongue much swollen, mouth emanating foetid odour, motions loose, tarry in colour, with very offensive smell and eye balls sunken with thick purulent discharge from both eyes. Microscopical examination of blood smears was positive for Surra. The swollen condition of the tongue in this case of Surra is a very uncommon symptom of the disease.

The above described unusual symptoms have been observed in one and the same disease—Surra—and the cases would have gone unnoticed if microscopical examination of the blood smears had not been resorted to. The importance of such an examination is therefore quite obvious in all such cases.

My thanks are due to Sri V. Parameswara Menon, Veterinary Assistant Surgeon, Veterinary Hospital, Trichinopoly, for the encouragement and assistance given in the examination of blood smears.

EGG-BOUND IN HENS

By

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and

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Introduction:—Egg-bound, a condition similar to that of difficult parturition in mammals, is not a rare occurrence in poultry. It is responsible for a good number of deaths in laying hens. At times it becomes difficult to find out the cause of death in birds dying of egg-bound and one has to conduct Post-Mortem examination to detect the real cause. We have had occasions of seeing this condition in a few autopsized hens. In these cases, bacterial and virus diseases were ruled out by bacteriological and biological tests.

Symptoms:—The complaint is noticed more often in the beginning of the laying period of the hen than at the latter part. It is seen mostly in older hens than in pullets and in crossbreds than in pure breds. The symptomatology presented by the poultry-men and seen in a few cases by the writers is more or less as follows. The affected hen sits frequently with an obvious desire to lay an egg and then rises without performing the Act. She strains as if attempting to dislodge some foreign material adhering to her cloaca. When she fails to get the desired relief she becomes restless. She very soon becomes depressed and lies prostrate. Eyes are staring with an expression of agony. She feels thirsty and when water is given she takes only a little quantity of it. After prolonged restlessness and prostration she dies.

Death is not directly due to the obstruction of the egg in the oviduct or in the cloaca but due to secondary causes resulting from the cessation of urination and defaecation. Sometimes, owing to the breakage of the egg inside the abdomen, death occurs from peritonitis.

Cause:—Why and how it occurs in some hens and not in others is very difficult to answer. Under normal circumstances the fully formed egg is retained in the uterus for several hours and then is expelled by the natural peristaltic movement and muscular contraction of the uterus. But when the condition "egg-bound" occurs, inflammation of the oviduct is invariably seen. The hen cannot exert herself due to pain resulting there from. Sometimes owing to paralysis of the duct the egg is not pushed out. An abnormal-sized egg, too big to be expelled through the narrow tube of the duct, is another factor which makes it physically impossible for the hen to lay it. Less frequently, it results from the actual stricture of the oviduct or by the twisting of the oviduct in such a way, as to close it. Accumulation of exudates following severe inflammatory processes either in the cloaca or in the vent prevent the hen from laying. In a few

birds what actually has been found, was a brownish inspissated egg material in the uterus. In such cases severe inflammation of the vent accompanied by extremely offensive odour is invariably noticed. A sequelae of egg-bound is the prolapse of the cloaca which is due to continuous straining.

Treatment.—When this condition occurs in a flock or when the symptoms narrated above are seen in affected hens, artificial help should be given. It is possible to expel the egg by inserting the finger, well lubricated with liquid paraffin, into the cloaca and gently manipulating the abdomen by the other hand. If it is not feasible to do this, then break the egg shell, remove the contents and pieces of egg-shell gradually without injuring the delicate cloacal lining. When this simple procedure, which is similar to that of embryotomy in mammals, is completed, inject saline cold water into the cloaca. Repeat this injection two to four times a day for a few days. Keep the hen as quiet as possible until she regains her normal health. An uneventful recovery may be achieved in such cases.

Association News

Minutes of the meeting of the Managing Committee of the Bombay Veterinary Medical Association, held on 9th January 1948.

The Managing Committee of the Bombay Veterinary Medical Association was convened on Friday the 9th January 1948 at 4 P.M. in the Library Hall of the Bombay Veterinary College, Parel.

Dr. D.S. Laud, President, was in chair.

The following members attended the meeting. Dr. D. S. Laud, Dr. S.G. Kshirsagar, Dr. S.B. Hanchlikar, Dr. M R. Redkar, Dr. R.N. Naik, Dr. G.H. Joshi.

Dr. S.R. Chadha and Dr. G.A. Hardikar were kind enough to attend by special request.

The Secretary Dr. S. G. Kshirsagar read last meeting's (Extraordinary Conference) minutes. An article in the form of a plan named as "Reconstruction plan for the development of Animal Science in India" was submitted by Dr. R.N. Naik for being read at the conference, held on 8th October 1947. It remained to be mentioned in the body of minutes, a copy of which was sent to the *Indian Veterinary Journal* for publication. The addition in the minutes was made as 4th article that was regarded as read.

The minutes were passed unanimously.

The Secretary then intimated the Committee, the steps taken by him in respect of the resolutions passed in Annual Conference and the replies received so far, with reference to letters written.

The President thereafter, read the letters received from Messrs. R. R. Tavargiri, D. C. Bhambhure and Y. V. Limaye and the letters he had written as an action taken on them. The Committee was satisfied with the action taken.

A letter from Mr. T. R. Khaladkar, Hon. Treasurer, wherein he had expressed his inability to work as Treasurer with a consequent request to accept his resignation was put before the Committee for consideration.

The following resolutions were then adopted:—

1. Resolved to accept the resignation of Mr. T. R. Khaladkar, Hon. Treasurer with a feeling of regret on his decision of resignation. The Committee consequently feels for the loss of his mature advice.

Proposed by S. B. Hanchlikar and seconded by R. N. Naik passed unanimously.

2. Resolved that Dr. S. R. Chadha be requested to accept the Hon. work of the Treasurer of Bombay Veterinary Medical Association for the year 1948.

Proposed by R. N. Naik and Seconded by S. G. Kshirsagar passed unanimously.

Dr. S. R. Chadha kindly complied with the request and was declared as unanimously elected Hon. Treasurer for the year 1948.

3. Resolved that the Government of Bombay be requested to revive "Horse Breeding" under the newly reconstructed Animal Husbandry Department; as the tribe "Horse" is an absolute necessity of a nation, and as it is seen in the province, in a depleted condition for want of systematic efforts of multiplication, on the part of the Government. It is also recommended to give a trial of this animal in agriculture in suitable area.

Proposed by R. N. Naik and Seconded by S. R. Chadha passed unanimously.

4. Resolved that no reference should be made to the Director of Animal Husbandry and Veterinary Science for permanent travelling allowance to Veterinary Assistant Surgeons as recommended in the general meeting of the Association, as it is detrimental to the interest of Veterinary Assistant Surgeons.

Proposed by S. G. Kshirsagar and seconded by S. B. Hanchlikar passed unanimously

5. "The Committee regrets to note the omission of Veterinary Degree or Diploma holder's recognition in the advertisement by Bombay Public Service Commission in *Times of India* dated 15-12-1947, for a post of Dairy Surveyor. The Committee is of opinion that a Veterinary Graduate is quite competent to discharge the duties in all the spheres of Animal Husbandry and Dairying.

It is further noted with great surprise that even Veterinary graduates having specialised training (Associateship) in Dairying in Bangalore Dairy Institute are also not regarded eligible for the post. We therefore look to it with great concern as barring a Veterinary graduate and more so a Veterinary graduate with specialisation in definite section, will result into disruption of Veterinary Profession. The Committee therefore requests the Government to amend the advertisement and recognise Veterinary Graduate eligible for this post and any other in Animal Husbandry Department.

Proposed by Dr. S. R. Chadha and seconded by Dr. M. R. Redkar passed unanimously.

6. The Committee expresses a general satisfaction in the revision of scales of Veterinary graduates employed in Bombay Corporation and requests the Municipal Commissioner to reconsider the starting salaries of Veterinary Inspectors in Market Department and Junior Inspectors in Slaughter House Department which is kept very low.

Proposed by Dr. S. R. Chadha and seconded by Dr. M. R. Redkar passed unanimously.

7. "Resolved to accord sanction to the expenditure of Rs. 31-8-0 incurred by the Secretary and sanction an amount of Rs. 30/- as typing charges or the year 1947.

Proposed by Dr. S. B. Hanchlikar and seconded by Dr. G. H. Joshi passed unanimously.

Mr. M. R. Redkar then proposed a vote of thanks to the chair for conducting the proceedings and the Principal, Bombay Veterinary College, for giving permission to use the Library Hall for meeting and the meeting came to a close.

S. G. KSHIRSAGAR,
Hon. Secretary.

D. S. LAUD,
President.

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[The views expressed in letters addressed to the Editor represent the personal views of the writer and must not be taken as expressing the opinion or having received the approval of the A.I.V.A.]

Veterinarians in Local Bodies.

Dear Editor,

It is deplorable that the recent enhancement of salary given by the Government to all Veterinary Graduates of the whole province, has not benefitted the poor Graduates serving in Municipalities. It is a pity that they have been completely ignored by the authorities with the result that there is complete dissatisfaction among them. There is nobody to fight for them. There is no one who realises, even in these days of scientific advancement, the importance and usefulness of these Graduates who are the guardians of public health. Their work is as much important to the welfare of the general public as the Government Veterinarians. Ever since I came to this country, I have been crying by writing in the our *journal* for the improvement of Municipal Veterinary work, to increase the status of the Graduates and to adopt an uniform system of meat inspection and slaughter house management in South India. But I am sorry that my cry has been a cry of the wilderness. The Director of Veterinary Services in his advisory capacity could have pointed out boldly to the municipal authorities to improve the present condition of slaughter houses which are in a most miserable condition. The salaries of the Veterinary Officers depend upon the whims and fancies of the municipal commissioners and the councillors. The provincial veterinary association also so far has not taken a bold attitude to rectify these defects. I must in this connection thank the Editor of our *Journal* for the selfless work he has undertaken to raise the status of the Subordinate staff of the Department by his continuous agitation through the medium of the *Indian Veterinary Journal*. I hope he will do the same for the Municipal Vets who are ignored unknown, unhonoured and unsung.

Madura }
10-7-'47.

M. V. PILLAI, G.B.V.C.

United Provinces Veterinary Association

Sir,

I am surprised to note that a resolution (14) has been brought forward during the 14th annual general meeting of the above association requesting the Government to give a courteous right to prefix "Doctor" before their names as is done in the Medical and Public Health Departments. I regret very much to remark that on the face of it; it is ridiculous and out of place. I have been

in close with our *Journal* and other *journals* and I had no occasion to find a resolution of this nature in any of them by any other associations. First of all to get a courteous right of 'Doctor' it is not necessary to approach for the permission of the Government. I don't mind in the least if I am called a "Doctor" or not, but I have found in my 30 years experience that many of my clients used to address me courteously as a 'Doctor' but not officially. In India the term Doctor is very freely and loosely used unlike other countries. Every man can become a Doctor overnight and can boldly use the title publicly. A homeopathy by correspondence course is a Doctor, a sex specialist is a doctor, a dentist is a Doctor and in fact nobody stands in your way of calling you a Doctor. When Doctor's title is so loosely used by any Tom, Dick and Harry, we Veterinarians, having undergone a rigid professional study, should not aspire ourselves to be included among bogus Doctors described above. Our profession is as honorable and useful as any other even without this designation. In this connection, I would like to express the fate of a Doctor who was practising Homeopathy in Singapore by publicly putting his board in front of his house as 'Doctor' without knowing the rules of British Malaya. Poor man was arrested and brought before a judge who questioned about his qualification and college in which he studied. It was finally proved by the detectives that he had only a Homeopathic certificate. He was therefore fined heavily for using the title. He was, previous to this incident, a P.W.D. overseer. He was made to change his title and now he is addressed as a 'Professor.'

Strictly speaking no one is entitled to call himself a Doctor officially unless one possesses the highest academical degree of M.D; D. Sc; LL.D. Ph.D., D.C.L. or D.D. conferred on him by recognised Universities by research work followed by a thesis. A medical man licensed to practice medicine is officially and socially called a 'Doctor' though he is not an M.D. Veterinary Surgeons possessing Doctorate Degree can be called a Doctor. In America every Veterinary Surgeon possesses a Doctorate Degree. But a surgeon having the highest degree of M.S; or F.R.C.S. of England or Scotland is styled himself as Mr. only. He does not loose anything by this nor does he feel sorry for not having the title 'Doctor'. Many of the Surgeons who do purely surgery have their sign boards written as Mr. so and so in Malaya. But if he is not addressed as a 'Doctor' in India, he gets annoyed. It is my firm conviction therefore that we Veterinarians do not loose anything or degrade ourselves in the eyes of the public if we are not called "Doctors."

Madura }
10-7-'47. }

M. V. PILLAI, G.B.V.C.

Wastage of Straw.

Sir,

Touring in the interiors of my jurisdiction, it has struck me as to how foolish it is to use paddy straw for the thatching of houses instead of using it

rightly as cattle fodder. There are many villages, where nearly 50 per cent of the straw produced in the village is used for the purpose and as a result the cattle of the village do not get enough straw throughout the year.

This practice of, what I call, wastage of the straw, or more correctly the cattle fodder, is prevalent in many districts of Bihar, Bengal, Orissa, and I think there are several other Provinces also where such kind of uneconomical and wasteful use of cattle feed is prevalent to a more or less great extent.

How nice and economical it would be to stop this practice? From ordinary calculations, I know that even the smallest house in a village requires for thatching as much paddy-straw as would be needed for maintaining one animal for nearly a year. And, therefore, if a village is supposed to comprise of 100 huts, then the feed of nearly one hundred cattle is wasted in this uneconomical way in that village. And think of the increased production from this extra feed to the starving cattle in that place? How much more milk, how much more manure, and how much more work and production becomes available then? These if properly managed will go a long way to help the Grow More Food Campaign.

Now the question is—how to check this wastage? In my opinion, the Animal Husbandry Departments of the Provinces concerned should take up this matter and, by intensive propaganda, put a check on this wasteful use of the valuable cattle fodder. They can even legislate and simultaneously grant loans to help poor villagers to purchase tiles, corrugated sheets and such other cheap and lasting materials for their roofing. It should be the task of the Animal Husbandry Departments to make the people know the proper use of the straw and explain to them the benefits they will derive from its proper use.

R. L. MALHOTRA,

Purulia Bihar.

Touring Veterinary Asst. Surgeon.

Civil Veterinary Department, Assam.

Sir,

It is very regrettable that Central Government's money allotted to the Post-war scheme of Assam, lapsing year by year due to the maladministration of Assam Government, in each Department.

In Assam Civil Veterinary Dept. alone about a lac of rupees was lapsed in last year. We are afraid this year also similar amount is going to be lapsed as it appears from the trend of progress of works made this year.

In current year Budget there are provisions for Establishing Four Govt. Hospitals in Assam, including one at Nowgong. Nowgong Municipality handed over 12 bighas of Nowgong Town land valued over Rs. 60,000/—free to the Government for establishment of a Government Veterinary Hospital last year but nothing was materialised though some several thousand rupees were allotted in the last year's budget.

In September 1947, the Executive Engineer, Nowgong, has prepared a Site-Plan for Veterinary Hospital and Veterinary Vaccine Section in the aforesaid land, as directed by the Chief Engineer, Assam, who in fact asked the Executive Engineer to spend the allotted amount before the 31st March 1948.

The said Site-Plan was duly signed by all the authorities:—Deputy Commissioner, Executive Engineer, Civil Surgeon, Chairman Municipality of Nowgong and others and sent it with estimated cost of Rs. 42,000/—to Shillong in September last for formal approval, but it is still rotting in Shillong. We are afraid if no action is taken immediately, the said amount will be lapsed this year as well.

In this connection it will not be out of place to note here that there is a provision of Rs. 75,000/- in the Post-War scheme for the Veterinary Section; but we are tired of hearing plea of non-availability of land and building which prevents starting of the said Vaccine Depot, though all implements are ready at Gauhati.

The above few lines were sent to the Editor, Assam Tribune, and Dainik Assamiya (New Press Gauhati—Tribune Building Gauhati) on 12-12-1947, but up till now no action has been taken. So it has been sent to you for favour of publishing in your issue as soon as possible.

It is to be noted here that for want of Vaccine (G.T.V.) about 200 Veterinary Field Assistants are sitting idle as Assam does not get any Vaccine from Calcutta as a result many cattle die of Rinderpest alone.

Nowgong, }
24th. December, 1947. }

RATHA KANTAH BORA, B.L.
Pleader.

Non-specific Metritis and Sterility in Bovines.

Sir,

Sterility is one of the biggest problems in a dairy herd. Its causes are many and varied. Congenital, Harmonal, Anatomical anomalies and specific causes all contribute to this and, therefore, are important in their own respective spheres. Their importance cannot be minimised. But the fact remains that non-specific form of metritis by far contributes a very high percentage of incidence.

Metritis generally results from protracted labour, putrid foetus, retained placentae and consequent extensive manipulation. Mild cases may resolve naturally in a period of one to three weeks, but most of them take obstinate course in spite of treatment. This either results in sterility or delayed fertility which are detrimental to dairy interests.

Line of Treatment:—The following treatment is universally adopted in the Military Farms Department in India as ordered by A.D.V.S. (Animal Husbandry), Extract from Re. & Veterinary Directorate Circular 2 of 1947.

"If the retained foetal membranes are there it should not be interfered with until 12 hours after calving in hot weather or 24 hours in cold water. Then, if removal by hand can be carried out easily and without roughness, this should be done; otherwise separate only those cotyledons that can be easily detached and inject one of the following mixtures into the uterus.—

- | | | |
|----------------------------|-----------|--|
| 1. Acriflavin | 1 part | |
| Water | 100 parts | |
| Glycerine | 900 " | Inject 100 to 200 c.c.
into the uterus. |
| 2. Lugol's Iodine Solution | 10 c.c. | |
| Glycerine, | 90 c.c. | |
| 3. Bismuth Subnitrate. | 1 oz. | |
| Iodoform | 1 oz. | |
| Cl. Arachis. | 500 c.c. | |

(Sulphanilamide 1 to 2 oz. may be included with advantage.)

Repeat the antiseptic treatment every second day until membranes can be removed easily or come away of their own accord.

After 5-7 treatments the uterus will have largely regained its tone and decreased in size and should now be washed out with a weak antiseptic solution such as Lugol's Iodine Solution 1 : 1000 on alternate days. It is a bad practice to use large quantities of aqueous solutions prior to this stage

If at any stage of treatment the animal is dull or running high temperature, Sulphanilamide should be administered by mouth."

In the *Veterinary Journal* of January 1947, it is recorded that Sulphanilamide may be given in doses of 3 oz. to start with to be repeated by $1\frac{1}{2}$ oz. dose every 5 hours for 5 days.

At least 7-10 days interval may be given before the administration of second course of Sulphanilamide.

In addition to the above line of treatment, I think the use of Pituitary Extract could be made of with advantage. It is a well established fact that post Pituitary Extract (Oxytocic principle) brings about contraction of uterus. This, if given along with the treatment given above, is likely to shorten the organ and thus reduce the surface area for further infection. The greater the surface area exposed, the greater will be the extent of infection involved and consequent severity of the attack.

In addition to this the attempt at contraction tends to hasten the institution of the organ which otherwise would hang down into the abdominal cavity making drainage very imperfect and difficult.

The experiences of Peter Kiddle and E. W. Jones as recorded in the January 1947 issue of the *Veterinary Journal* lends support to this suggestion of using Pituitary Extract in these cases of Metritis.

Lahore, }
15th June 1947. }

RIS. DHARAM PAL, I.A.V.C.
Veterinary Assistant Surgeon,
i/c, Military Farm, D. I. Khan,

IMPROVEMENT OF SHEEP IN INDIA.

(With a reference to Baroda State)

Sir,

Sheep Breeding and Wool Production is one of the few prominent rural Industries in India. Inspite of this fact, it is a matter of great regret that till very recently the various Governments i.e., Central, Provincial, and Native States, in the country laid little attention for the proper development of this industry. Now it may be observed that almost all the Governments are so to say becoming Sheep and Wool conscious and have started setting apart a quota out of the revenue for the development of this Industry. Mere determination on the part of any Government to spend some money for a purpose will not help it to achieve the desired end. A clear understanding on the part of those who are responsible for developing the industry and of the populace engaged in it is more than essential. The outstanding object of any such scheme should be to improve the breeds of sheep so that such improvement may raise the economic standard of the shepherd and thus the national wealth of the State itself. It should be borne in mind that even the process of such improvement should in no way clash with the immediate interest of the shepherd. In this connection, my own study of the existing conditions in the sheep tracts of the Baroda State, will, I hope act as a guide to others who are similarly engaged in the development of this industry in other parts of the country.

Baroda State has been fortunate enough to possess a natural breed known as the Patanwadi Breed, which is almost the best wool breed in India. Five years ago it was realised by the State that such a potentially rich breed was deteriorating due to lack of any farsighted and scientific breeding policy on the part of sheep owners. For the purposes of preservation and improvement of this breed, a wool improvement section was established. For the last five years this section has been working for the improvement of Patanwadi Breed. The Patanwadi tract is prominently spread over the Mehsana District of Baroda State. There are about three thousand flocks in this area on an average of fifty sheep to a flock. The sheep breeders in this area are known as Rabharis, for whom the flock is the mainstay. A flock of fifty sheep can maintain a Rabhari family through its return and therefore sheep rearing is quite an attractive profession. In the Patanwadi tract, the shepherd realises money by selling the milk and wool of the sheep. The progenies only help him to maintain the strength of his flock at a static level, balancing the losses from old age and diseases. A Rabhari is extremely sentimental and this prevents him from cashing the excessive male progenies by culling them from mutton purposes. In Gujerat, sheep's ghee is used as an adulterant to cow's and buffalo's ghee. This practice has kept the prices of sheep's ghee at quite an attractive level. Thus manufacture of ghee from sheeps milk is a very profitable proposition to the Rabhari. About 85% of the income he gets from the flock, he realises from the milk and the rest through wool. At the present time wool is only of secondary importance to the Rabhari. Ordinarily a sheep is not an animal meant

by Nature for milking purposes. The milk produced in a sheep under ordinary conditions is just enough for nourishing its offsprings. But if any milk is to be drawn after satisfying the lamb, the mother-ewe should be sufficiently fed ; and this a Rabhari cannot afford. The extra feeding, even if given, is not going to be an economically sound proposition for him. So the Rabhari milks the sheep without any special feeding to the ewe and thus snatches away the milk intended for the nourishment of the lamb. That is the reason why in this tract lamb mortalities are every common. So it is of vital importance to immediately put an end to this evil practice of milking of the sheep. Such a recommendation is easy no doubt, but very difficult to enforce. If the Rabhari is to be persuaded to abandon this evil habit, he has to be shown methods and ways to compensate his losses due to such stoppage of milking. He should be made to concentrate his attention more on the production of wool and good progenies. Realisation of money by culling the discarded sheep for mutton purposes should be put before him vividly. Castration of superfluous ram lambs should be popularised. All these no doubt call for a big battle for eradication of sentimentalism in the Rabhari which is not only hitting his interests seriously but also greatly impeding the prosperity of the industry itself.

Rabhari is economically under the clutches of the village Baniya or the money lender. The Baniya, in virtue of his shrewdness and wealth, exploits the Rabhari by lending him small amounts of money at the time of his needs. Through this timely obligation, the Beniya forces the Rabhari to sell his goods to him at low rates. This hinders the sheep-farmer from realising the best price for his products. The conditions for sheep farming are more or less governed by similar factors in all parts of the country. Any scheme aimed at the improvement of Sheep Breeding for various purposes should be undertaken only after thoroughly studying the existing conditions of the sheep, their outstanding characters, the uses they are put to at the present time and the economic condition of the sheep-farmer. It should be further borne in mind that the prosperity of the sheep and the sheep-farmer go together. No move intended for the amelioration of the sheep breeds in India, should be tackled in such a way that it upsets the very social life of the shepherd himself, as this move will only create suspicion in his mind and makes him evade instructions. Changes should be gradual and steady. In India, as a rule, the shepherd class has been economically and intellectually backward. The main reason for this has been, that his income has not been adequate enough to make both ends meet. This low income is due to the fact that his actions are governed by false economy and rigid and harmful social customs. The breeding policy of the shepherd at the present time is not only superficial but is also very unscientific. The shepherd remains a looser twice. Firstly he does not take proper and necessary care while collecting the 'products', and so, puts himself in a disadvantageous position. Secondly he does not study the market and consequently does not realise the proper price for the 'products'. Thus he is hit both in the collection and in the marketing. If this fact is realised by the undertakers of

sheep-development in the country and due consideration is given to this, the development programme is bound to be successful. As the prosperity of the industry is dependent on production and marketing, modified methods have to be employed for production and marketing the sheep and their products.

The foremost step towards the improvement of sheep and wool industry in India, lies in freeing the shepherd from the clutches of the Baniya. If this is to be done, an organisation should be created to displace the Baniya, the duty of which should be to afford all the facilities that a Baniya extends to a shepherd carefully avoiding the malpractices and exploitations of the Baniya in every form. Such an organisation can only be a sort of a cooperative society run by the shepherds themselves. But the shepherds are basically a backward class that it will be an up-hill task to make them capable of running a cooperative organisation. So, to begin with the Government should act as the guardian of this institution. The functions of this institution should be to provide the needs of the shepherd charging a nominal profit and market his products for his maximum benefit. This will create a confidence in the mind of the shepherd and make him alert to the necessity for improving the conditions of his sheep and himself.

This Cooperative Society or Sheep breeders' Association or better called by any suitable vernacular name should be made the nucleus for all activities of development of sheep. This should be a quasi Government body and should also be liasoned with the research work undertaken by the Government. The enrolling of shepherd members to this association is a very big task. Any imposition of fee to members in the beginning will only scare away the shepherds. To begin with the association should be more of a social nature and should be a centre of attraction to popularise it amongst the shepherds who are the back bone of this industry. All these will no doubt require fairly huge sums of money and the Government should not hesitate to spend on such an essential cause as building of the sheep wealth. The choice of place for the location of these activities is a very important matter. It should be as far as possible such a place which is easily accessible to all the flock owners in a particular tract. If the tract is distributed over a vast area more than one centre should be established. The function and aim of this organisation should be, to be always attentive to the reasonable needs of the shepherd and be his guide for the prosperity of himself and his flock.

Sheep Breeding is a science by itself and its methods vary according to the conditions of the areas in which they are to be undertaken. The governing factors for this are climate, availability of pasture, the condition and quality of the already existing breed and the customs and habits of the local breeders. Giving due consideration to all these factors, research has to be undertaken to learn methods for evolving the desired and practicable breed in the shortest period possible. The evolution and preservation of breeds go hand in hand. Before advising any particular breeding policy to the shepherds the method

should be properly tested and experimented. It should always be borne in mind that as far as the shepherd is concerned, sheep rearing is nothing more than a commercial enterprise to him and as such the methods advised should always be economical and within the means of the shepherd.

The problem for research to be undertaken varies according to regions, their results are to be adopted. For example in Gujrat, milking of sheep is prevalent, whereas it is almost unheard of in other countries. So this is a special problem for study in Gujrat where all its effects on the ewes and lambs have to be studied. In the same way, different tracts of sheep possess their own peculiarities either acting as drawbacks or advantages of these have to be discovered. It is the duty of research workers to realise the harmful effects on sheep of such practices by studying animals kept under observation and control. Existing malpractices should be openly discouraged and before doing so suitable substitute measures should be found out.

The important uses the sheep is put into at the present time are for the production of wool, for the purposes of mutton, for the manuring of fields, for skins and lastly also very questionably for the production of milk. It should be the aim and desire of every worker in this line to increase the yield of all these products and at the same time improve the quality.

Jaipur State, Jaipur.

N. L. NARAYAN,
Sheep & Wool Improvement Officer.

Chronic Luxation of Patella.

Sir,

I have gone through the articles of Mr. M. Ramakrishna Pillai, and Mr. Md. Rahim-Ud-Din in the *Indian Veterinary Journal* Vol. XXI, No. 1 and of Mr. K. Venkataraman in Vol. XXIII No. 5 regarding Chronic Luxation of Patella. I fully agree that treatment with Liq. Iodine Mit gives successful result with one or two injections at reasonable interval, but I do not agree with Messrs. Pillai and Venkataraman regarding the confirmation as an etiological factor.

They say that when young animals are put to heavy work for the first time this affection usually occurs probably due to the undue strain brought about by heavy work on the tendon in mature ligaments of the femero-patellar articulation but in my experience in the State and Deogarh Model Dairy Farm I have seen this affection occurring in both male and female animals without their being put to work. In this farm, there are two cows which have got luxation of patella. Observations for the last several years have shown that cases of Luxation of Patella are confined to the offsprings of these two cows which get the complaint sooner or later, though there are other 100 heads of cows along with them with some care, management and ration. Generally the complaint is noticed between 1½ years to 3 years.

And this, irrespective of their being put to any work. Further, the heifers and cows are not given any work and yet they get the complaint. Therefore the statement of Pillai and Venkataraman cannot be substantiated. Cases of Luxation of Patella occur both in working and non-working animals. Under these circumstances the etiology of Luxation of Patella is still unknown and require investigation.

Bamra State, E.S.A.

N. GOUNTIA, G.V.SC.,
Veterinary Assistant Surgeon.

The Indian Dairy Science Association

Sir,

An Association called "Indian Dairy Science Association" was formed about two months back at Bangalore and a provisional executive committee was appointed. A meeting of this committee was held at New Delhi on the 16th December with Sardar Bahadur Sir Datar Singh, Vice-Chairman, Indian Council of Agricultural Research, in the chair. It was decided to open the membership of the Association to all persons engaged in teaching, research and advisory work in dairying persons holding technical positions in the field of dairying. The Association has received the support of leading dairy scientists and the Association's aim is to publish a journal devoted to dairy science in all the branches in course of time. The need for such a journal devoted exclusively to this subject has been universally felt.

The work of enrolling Foundation Members is proceeding briskly and in such a short time of its foundation the Association has on its roll over fifty members. A good response is expected from the past members of the Indian Dairy Research Institute, Bangalore, Agricultural Institute, Allahabad and other qualified persons who have been anxious to bring into being a voluntary association of dairy scientists. Amongst its objects the Association aims at the advancement of dairy science in all aspects by the dissemination and application of knowledge, providing opportunities for the exchange of knowledge and ideas through discussion and other means, collaboration with other institutions engaged in activities relating to advancement of dairy science, and encouragement of scientific enquiry into problems arising in the dairy industry. For the present the headquarters of the Association is located at the Indian Dairy Research Institute, Bangalore, and those desirous of joining the Association should communicate with the Joint Secretary of the Association.

Indian Dairy Research Institute
Hosur Road, Bangalore.
Dec. 22, 1947

H. LAXMINARAYANA
Hon. Joint Secretary.

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General Articles

ROLE OF CATTLE WEALTH IN INDIA*

BY

THE HONOURABLE MR. JAIRAMDAS DOULATRAM,
Minister for Food and Agriculture, Government of India.

I am glad it has been possible for me to snatch some time from other urgent duties and come and open this All-India Cattle Show. I have come because I realise the important place which the cattle problem occupies in the national economy of our country. With so many big questions confronting the nation at the present moment, it may appear as if one were diverting time to a small affair in performing the opening ceremony of this cattle show. Clouds are still thick over Kashmir, scarcity and who knows worse is in the offing in Madras, our fellow Indian evacuees from Pakistan are still awaiting full response from the people of India. Other problems also occupy our present thoughts. But despite these urgent calls on our time and attention, we cannot afford to ignore those problems the far-sighted solution of which affects the very foundation of the nation's economic life and, therefore, the happiness and well-being of our people. Our country has achieved its freedom. Let us fill in now the true contents of such freedom. Let us reconstruct the nation's economic life on right lines. And so in the midst of other demands on us, we cannot but spare time and energy to concern ourselves with programmes which are intended to give a proper direction to long range plans for our country's economic welfare. Hence it is that you find me in your midst even though it be for a brief while. I have agreed to participate in to-day's function, not because I am Minister of Agriculture, but because I fully appreciate the importance of cattle wealth to our predominantly agricultural nation and, therefore, its close connection with the vital interests of the people.

* Address delivered at the opening of the Seventh All-India Cattle Show in New Delhi on the 29th January 1948.

Cattle Show Society

I congratulate the workers of the All-India Cattle Show Society for the good work it has been performing. The society was started by the Government of India in the year 1938 with the object of organising and establishing periodical shows of cattle and poultry and to carry out all activities for the furtherance of breeding and improvement of livestock in India, to undertake propaganda for the improvement of animals and poultry in India and to spread the knowledge of the principles upon which better animals and poultry may be bred. Besides the central show held in Delhi, two regional shows and several smaller shows in the well-known breeding tracts are held annually with the help of Provincial and State Governments. I know the Society can do far more service if its financial resources were greater and I hope it will not be long before its funds are substantially augmented to hold it to serve better cause of agriculture.

Two-fold Problem

You know that India is essentially an agricultural country and cattle are the backbone of agriculture. About 80% of India's rural population is agriculturist, for whom cattle have an importance of their own. They occupy a unique position in the rural economy of this country and have therefore been an object of special care and affection in India from the most ancient times. Our problems are two-fold. We need more milk and milk products to provide an adequate diet to our people and we need better, healthier and stronger bullocks, for in all agricultural operations oxen are indispensable to the Indian farmer.

Present Position

We possess one-third of the total cattle population of the world. According to the 1941 census report, the total bovine population (cattle and buffaloes) of undivided India was 208.2 millions. It is estimated that as a result of the partitioning of the country, about 30 million cattle have gone to Pakistan. In spite of our huge cattle population, the country is in short supply both with regard to bullocks as well as milk. One of the main reasons is that our cattle suffer essentially from food shortage. The slow process of starvation to which our livestock is exposed, is evident from its unthrifty condition, poor productive capacity, stunted growth, late maturity and long inter-calving period. We thus lose millions of tons of milk and an enormous amount of horse power. Do we realise what this means in terms of national health and production and therefore of national wealth? As matters stand at present, not more than 60% of the fodder required is available and only one-fourth of the total concentrates needed can be obtained. The position with regard to the supply of milk is still worse. About 22 million tons of milk is produced annually from cows and buffaloes in India. This must be increased to about 65 million tons to meet the minimum

nutritional requirements of our people when calculated at the rate of 1 lb. of milk per day per head of the population (8 oz. in milk and 8 oz. in the form of milk products, ghee, butter, etc.). To allow for the feeding of calves, another 10 million tons is needed. The present per capita consumption of milk in this country is only 5 to 6 oz. In some of the other countries, it is far greater. It is as much as 40 oz. in Denmark, 45 oz in Australia, 35 in U. S. A. and 39 in Great Britain. It would thus be seen that although we possess the largest cattle population in the world, we supply the least quantity of milk per head for human consumption. Cattle rearing in this country is carried out under a variety of adverse climatic and other environmental conditions. The average cattle breeder is poor. He lives on small fragmented holdings, the large majority of which are less than 5 acres. The average size of his herd consists of only two to three animals as against 27 to 28 in countries like England and U. S. A. The units are thus uneconomical and the individual owner cannot by himself introduce any appreciable improvements.

Considering the immensity of the task and the numerous complications, the solution is not easy to find, but it is evident that we must endeavour to improve our cattle by better feeding and management.

Better Feeding

The problem of providing more fodder and concentrates for our cattle is indeed difficult, for pressure on land is already heavy and there is serious competition between man and animal. In any plan to bridge the gulf between supply and demand as regards deficiency in cattle feed, the requirements of human beings must, of course, receive primary consideration; but on a careful review of the entire position in regard to cultivation and yield as a result of introduction of the latest scientific methods, it appears possible that by re-adjustment of our cropping programme some extra feed can be made available for cattle. But their total requirements can only be met if production from land can be increased by about 50%. We must, therefore, tap every other source to supplement food for cattle. These sources can be :—

(1) Hay and silage making out of the surplus grass which is available during monsoons should be practised all over the country. There are 136 million acres of grazing land in India. No precise data are available as to how much grass this land produces, but the limited information we have, goes to show that the production of grass is about 2 tons green per acre. At least one-third of it could easily be preserved as hay or silage. All this now goes to waste.

(2) A number of forest areas under the Forest Department grow large quantities of grass which should be made use of by cutting and preserving as hay or silage.

(3) Crops which are known not only to increase the quality of nutritious fodder but also improve fertility of the soil such as Burseem should be extensively grown, wherever possible.

(4) Large quantities of oilcakes are at present used entirely for manurial purposes. It is a matter for consideration if this cake would not equally serve the object in view if some of it is passed through cattle.

(5) The Nutritional Laboratories of the Indian Veterinary Research Institute have extensively explored the possibility of new sources of food-stuffs and it has been shown that mango seed kernel, munj, kans, jammun seed, acacia pods, groundnut husk, bawar seed are rich in feeding value and can be extensively used as feed for cattle. The methods of their preparation and use have been described in detail in one of the issues of the *Indian Farming* published by the Indian Council of Agricultural Research.

(6) The deficiencies in rice straw, if corrected by the addition of bone ash, will increase the utilisation of this foodstuff.

(7) A great deal can be accomplished, if the mixed farming practices are more widely adopted.

(8) Thirty per cent of waste can be saved if all fodder is chaffed before being fed to cattle.

(9) More use should be made of fodder bearing trees, as their leaves and pods provide excellent fodder.

(10) The fish meal industry in the country should be developed so that more of highly concentrated protein food is made available in the form of fish meal for cattle.

Improvement by Breeding

Planned scientific breeding of animals is also necessary for improvement of our cattle. A number of Government farms are at present producing pedigree bulls of various breeds and these animals are distributed in the villages for the improvement of local stock. There are about 45 such farms in India which annually issue about 1868 bulls. Considering the requirements of the whole country, these 1868 bulls distributed annually do not meet even 1% of our annual requirements. To produce the bulls required annually for the whole country at the Government farms is not a practical proposition. Our efforts to improve the village cattle should, therefore, be concentrated in the following directions.

(a) All bulls issued from farms should be located in a specially selected breeding tract and concentrated in a few villages, so that casualties and replacements are assured. From this area all other male stock should be removed. In due course, these "Key villages" would be in a position to supply the better bred animals for distribution in other areas.

(b) Efforts should be made to evolve dual purpose breeds, that is, breeds which would produce good working bullocks and also yield a fair amount of milk. Work in this connection is in progress with some of the indigenous breeds such as the Harianas and the Hallikar. The Government of India are now setting up a farm at Jubbulpore, where it is proposed to study this problem in great detail.

(c) The method of artificial insemination is being widely practised in several other countries, where it has definitely proved its value. Work done at the Indian Veterinary Research Institute has shown that a great deal can be achieved even under Indian conditions. Four experimental field centres set up recently have yielded very promising results. By the adoption of this method one bull can do the work of 10 and extensive use can be made of really superior sires. It is, therefore, essential that necessary steps should be taken by all Provinces and States to explore the possibilities of the use of this method to the fullest extent.

I do not propose to deal in to-day's speech with all the problems relating to our cattle wealth and thus blur the main outline of the picture. I want on the contrary to draw particular attention to that outline alone. Hence I propose to content myself with this brief reference to the outstanding features of the cattle problem in our country. The topical questions of the prevention of slaughter of cattle or the salvage of useful cattle from slaughter, and the insurance of cattle are all under examination by Committees and I hope their results will be before the public ere long. These and other allied questions will be, I trust, satisfactorily dealt with in due time. This will however be only possible if we realise that the cattle problem in India is not merely a humanitarian problem of animal welfare but that in it are substantially involved both the health and the wealth of our nation. The earlier we realise this the sooner shall we see the end of poverty and disease in this country.

We have met under the shadow of a great national tragedy. Within a yard from here lies a simple memorial of the life and work of the greatest well wisher of the animal world. Let us follow his lead in solving the cattle problem of our country and so do our duty even in a small way in keeping alive our departed leader's memory in this land.

BOVINE STERILITY*

By

S. JACOB, G.M.V.C.,

District Veterinary Officer, Cuddapah.

The Subject of Bovine Sterility is one of great importance to all those concerned with Livestock Improvement. The enormous loss caused by this scourge has never been realised so well as at present, when people are confronted with the problem of food shortage on account of the abnormal conditions brought about by the War. The Survey Committee formed by the National Veterinary Medical Association of Great Britain and Ireland after making a Special Investigation on diseases of Farm Livestock observed that it was profoundly impressed with the enormous loss in milk and calf production caused by temporary infertility and by sterility of bovines in the United Kingdom and that 80% of this loss is preventable. The Committee estimated that on account of sterility alone the annual loss of milk yield is 7 million Sterling (or 9.5 crores of rupees) and the loss in calf production is six hundred thousand sterling (or 84 lakhs of rupees) in the United Kingdom. If such colossal loss is incurred on account of sterility in a country with a cattle population of 1/30th of that of India and less than 1/3 of that of Madras Presidency, it is not known to what magnitude the loss incurred due to this scourge in India can be estimated despite the lower milk yield of Indian Cattle. For want of such revealing statistics to indicate the extent of Bovine Sterility in India, perhaps some people may think that the position in respect of this disease in India is not so bad as it is reported to be in the United Kingdom, but an officer of the Indian Veterinary Research Institute, who made an investigation tour of the country observed that it could not be denied that Sterility is common in India, and that, in his opinion, it is hardly possible to enter a village, at least in South India, without encountering numerous cases. He has further observed that in the Livestock Improvement drive, Sterility is as important as the castration of the Scrub Bull, and that there is no excuse for its diagnosis and treatment not becoming an almost daily part of the cattle practitioner's routine.

Mr. S. Y. Krishnaswami, O.B.E., I.C.S., in his Monograph on the Rural Problems in Madras observed as follows :—

“According to the latest census report the total number of cows in milk is 1,864,038 and that of dry cows is 2,155,862. Herein lies the waste of wealth with regard to our livestock. It is notorious that our cows are irregular breeders. The dry period beyond a certain limit is an avoidable waste. It is usual in villages to overlook the oestrus period and the cows do not get served at the proper time

*Paper read at the annual District Veterinary Conference Cuddapah, on 21st December 1947,

and thus the interval between two calvings extends to over a year and in some cases to two years. This increases the number of dry cows in proportion to cows in milk. The cost of feeding during the dry period coupled with the loss of milk is a waste. To add to this, there are large numbers of useless and sterile animals which do not breed at all. There are many others which are diseased and unfit for work. The total number of cows which have not calved and which are not working exceeds a million."

A thorough knowledge of the re-productive organs of the cow, their physiological functions, and the technique of pregnancy diagnosis are absolutely necessary for a practitioner who desires to undertake the treatment of Sterility. This need not scare the beginner or the uninitiated, as experience reveals that with a little interest and effort an average practitioner can acquire a certain amount of proficiency in the treatment of Bovine Sterility and diagnosis of pregnancy in its early stages.

The National Veterinary Medical Association of Great Britain and Ireland has arranged for the benefit of its members, free Refresher tuition in Pregnancy Diagnosis and the treatment of infertility in bovines. Practitioners desiring to take advantage of this tuition have to provide facilities for the tuition to be given in their own locality and intimate the fact to the General Secretary of the Association. Instructors who have specialised in the subject have been appointed to carry out the Refresher tuition by visiting different centres to give the tuition and necessary demonstrations for a day or two to the practitioners gathered at each centre. (*Veterinary Record* dated 1-11-'41 and 21-2-'42). Reviewing in the Editorial Column of its issue dated 30-8-'41, the *Veterinary Record* has commented as follows on the usefulness of this tuition. "It behoves every Veterinary Practitioner to see that he is in the position to render efficient service to his client both in the diagnosis of pregnancy and the treatment of infertility..... For a long time past, pregnancy diagnosis and the treatment of infertility, have been regarded as being only within the scope of the expert. More recently, however, at demonstrations which have been arranged by divisions, it has been pointed out that it is well within the capacity of the average practitioner. In the main report in this issue, the speaker clearly reveals in a masterly but simple diction how relatively easy it is for even the least experienced to acquire a high degree of efficiency..... We are pleased to learn that further appointments are being made to enable individuals to undergo an intense course of study in the subject of infertility; we also congratulate the Association upon its initiative and its public spirited action in arranging refresher tuition by practitioners for their colleagues who, until now, have lacked the opportunity of acquiring the necessary technique associated with this important subject."

Even though such facilities do not exist in India at present, there is a way to acquire a working knowledge of the subject, if one has the interest and perseverance to pursue the practice suggested below. When the writer joined the ranks of the profession early in the twenties, Nasal Granuloma and String-halt were held to be incurable maladies of cattle, at least in this Province. The crude methods of treatment then practised against these maladies will look queer, not only to the posterity, but even to us, when we look back at them in retrospect. Thanks to the ingenuity, resourcefulness and skill of some of the practitioners, who unceasingly laboured at finding some suitable remedies for these ailments, and published their observations in the Veterinary Press and thus roused interest in the rank and file of the profession, with the result that the *Madras Veterinary Journal* (then existing) and subsequently, the *Indian Veterinary Journal* used to be flooded with articles on the subject containing various observations, criticisms and suggestions. This upheaval of interest among the Veterinary Practitioners in this country, has not only resulted in evolving successful lines of treatment for both the ailments, but also in educating the rank and file in the profession about the technique of treating the two ailments referred to above. Similarly, the writer of this article hopes that the members of the profession in this country will take keen interest on the subject of Bovine Sterility and publish in the columns of this *journal*, their observations on this subject.

Before dealing with the subject of Bovine Sterility, the writer proposes to give here a brief description of the anatomical features and the physiological functions of the reproductive organs for the benefit of the readers who do not have the facility of referring to current literature on the subject.

The glands and organs which are responsible for reproduction are:—

1. The Pituitary;
2. The Ovary;
3. The Fallopian tubes;
4. The Uterus;
5. The Vagina;
6. The Vulva and
7. The Mammary Glands.

Pituitary Body (Hypophysis Cerebri) is oval in shape, flattened dorso-ventrally and nearly an inch in width in the horse, and narrower and thicker in the bovine. It is divided into two parts which can be distinguished on section by their colour. They are known as the Anterior and Posterior Lobes.

The ovaries of the cow are much smaller than those of the mare; they measure usually about one and a half inches in length, and an inch in thickness, the weight is about half an ounce. They are oval in form, and are situated usually a little above the middle of the lateral margin of pelvic inlet in the non-pregnant subject. They are thus about 16 to 18 inches from the vulvar opening in a cow of a medium size. Follicles of various sizes are often seen projecting from the surface as well as Corpora Lutea.

Corpus Luteum is yellow in colour and may reach a width of half-an inch or more.

The *Fallopian tubes* are about 10 inches (20 to 25 cms) long. The uterine orifice of the tube is large and funnel shaped. The *Fimbriae* are not so extensive as in the mare.

The *Uterus* lies almost entirely within the abdominal cavity of the adult. The body is only about an inch and a half in length, although externally it appears to be about 5 or 6 inches long. This false impression is due to the fact that the posterior parts of the *Cornua* are united by connective and muscular tissue and have a common peritoneal covering."

The *Cornua* are about 15 inches long and taper gradually towards their free end. The horns curve at first downwards, forwards and outwards and then turn backwards and upwards forming a spiral coil.

The *Cervix* is about 4 inches long with a dense wall of about an inch in thickness. Its lumen, the cervical canal is spiral and is ordinarily lightly closed and very difficult to dilate.

The muscular coat of the uterus of the cow is thicker than in the mare. It consists of an external longitudinal layer and two circular strata. The inner circular layer is about a fourth of an inch thick in the *Cervix*. The mucous membrane of the horns and body presents as a characteristic feature, the uterine cotyledons, which are oval prominences numbering about a hundred, irregularly scattered over the surface or arranged in rows of about a dozen. In the non-gravid uterus, they measure about half an inch long and a little less in width and thickness, but during pregnancy they become greatly enlarged and pedunculated, some reaching upto 4 to 5 inches long and an inch and a half thick, and spongy in appearance.

The mucous membrane of the *Cervix* is pale, glandless and forms numerous folds, which on account of their presence in several series, obliterate the lumen. At the external uterine orifice the folds form rounded prominences arranged circularly which project into the vaginal cavity. As already said, there are no glands in the *Cervix*, but a thick mucous is secreted by goblet cells.

The vagina is about 8 to 10 inches long in the non-pregnant animal but in the pregnant animal it increases to 12 inches.

The vulva consists of thick wrinkled labia. It lies about two inches behind and 2 inches below the level of Ischial Arch.

The Oestrus Cycle :—Of the various hormones generated by the anterior lobe of the Pituitary body the most important gonadotropic hormones are Prolan A, or follicle stimulating hormone (F.S.H.), which stimulates the growth of the graafian follicle in the ovary, and Prolan B, or

lutensising hormone (L.H.), which causes rupture of the graffian follicle and growth of the Corpus Luteum. A third hormone (viz.) Oestrin, produced in the graffian follicle brings about increased vascularity and enlargement of the Uterus and Vagina together with the physiological symptoms of Oestrus or "Heat" which usually lasts in the cow from 2 to 24 hours. A graffian follicle may be detected upto 36 hours after the onset of the Oestrus, and then it ruptures liberating the ovum. Ovulation generally occurs between 36 hours to 42 hours after the onset of the Oestrus. When the follicle has ruptured the layer of the cells lining the cavity proliferate rapidly and produce a corpus luteum "Yellow Body of Pregnancy". This body can be easily detected, adhering to the ovary, from 8 to 12 days, when it reaches its maximum size, after which it recedes and atrophies disappearing about the 16th to 18th day after onset of the Oestrus, if fertilisation has not taken place. But if pregnancy supervenes the corpus luteum persists and produces a hormone called Progesterone, which inhibits ovulation, maintains the uterus in a condition favourable to the development of the embryo, stimulates the development of the mammary gland, and desensitises the uterine muscle to oxytocin, a secretion of the posterior lobe of the Pituitary gland which has the property of bringing about the contraction of the Uterine muscle. The Placenta also secretes progesterone. Relaxin, which is another hormone brings about relaxation of the pelvic ligaments and Prolactin secreted by the Anterior Pituitary gland stimulates mammary secretion. As the Corpus Luteum gets atrophied towards the end of pregnancy, its influence ceases, and the Oxytocin produced by the posterior lobe of the Pituitary brings about the contraction of the Uterus and expulsion of the foetus.

In the normal cow oestrus occurs once in every 20 to 23 days and lasts for about 2 to 24 hours in cows and 12 to 18 hours in buffaloes. Spermatozoa which are ejaculated into the posterior part of the genital passage, the vagina, as a result of copulation during the oestrus, travel all the way up the passage, right through the cervix, the uterus, the cornua and the fallopian tubes with the help of the wavy movement of their tails or flagella and on reaching the fimbriated end of the fallopian tubes lie in wait for the ovum. As a result of ovulation which occurs from 36 to 42 hours after the onset of the Oestrus, the ovum is dropped by the ovary into the fimbriated end of the fallopian tube. Then one of the Spermatazoa which are lying in wait for the ovum, pierces its head into the ovum and fertilises it. Fertilisation usually takes place at the fimbriated end of the fallopian tubes. The impregnated or fertilised ovum then travels down the fallopian tube and gets embedded in the mucous membrane of the Uterine horn and starts the chapter of prenatal life of a would be living creature on earth.

Etiology of Sterility or Infertility in bovines has been classified in different ways by different workers. But the following perhaps is the most suitable classification to give a clear perspective of the subject and to make it easily understandable.

- | | |
|--------------------------|--|
| A. <i>Infectious:</i> | 1. Specific; 2. Non-specific. |
| B. <i>Non-Infectious</i> | 1. Functional— (i) Hormonal Imbalance or Maladjustment.
(ii) Physiological derangement. |
| | 2. Inflammatory or Traumatic |
| C. <i>Nutritional:</i> | 1. Dietetic Errors Viz., Irregularity or Insufficiency of feeding. |
| | 2. Mineral Deficiency. |
| | 3. Vitamin Deficiency. |

A. 1. The Specific Infectious diseases causing infertility are Tuberculosis, Brucellosis, and Trichomoniasis. The first may be eliminated from our consideration for the present as it is considered that the incidence of Tuberculosis in India is not very common. Most of the cases of Catarrhal Endometritis are caused by Brucellosis, while most cases of Pyometra and some cases of Catarrhal Endometritis are due to Trichomoniasis. Brucellosis often causes abortion during the first four months of pregnancy and Trichomoniasis generally causes abortion between the 4th and the 6th months.

2. The Non-specific infections are Pyogenic infection leading to Pyometra, coital exanthema or vesicular vaginitis or "Bull Burn" which is probably due to a virus, and contagious granular vaginitis of which the cause is not known. The latter two conditions may prevent a successful mating due to consequent irritation and even when a cow is successfully crossed, she may not hold due to the constant irritation of the genital passage by these conditions. Weekly irrigation with 1 : 1000 Iodine lotion or 1% Zinc Sulphocarbonate or mere saline solution containing a handful of common salt in a couple of gallons of water is said to be beneficial in these conditions. In cases of Vaginitis due to Trichomoniasis, vaginal irrigation with lactic acid in 3% solution is said to be helpful.

B. 1. Under Non-infectious causes, functional deficiency may be considered first. This may be further divided into (1) Hormonal Imbalance or maladjustments and (2) Physiological derangements. The chief manifestations of these conditions are "Silent Heat" and Anoestrus condition brought about by lack of Gonodotropic hormones and persistent Corpus Luteum. The first may be overcome by injections of Pregnancy Mare

Serum, Antutrine "S" or Urine Hormone, and Stilboestrol and the second can be overcome by enucleation of the persistent corpus luteum by digital pressure through the rectum.

A line or two about the details of treatment with the various agents mentioned above may be of interest here. Pregnancy Mare Serum, which is rich in Prolan A or follicle stimulating hormone when injected subcutaneously in doses of 1500 international units induces Oestrus and ovulation. This is specially indicated in anoestrus conditions in which the ovaries are small and shrunken without any corpus luteum or large follicles. It should never be injected when corpus luteum is present. It is not only unnecessary, as oestrus can be induced by removal of the corpus luteum, but if given in the presence of corpus luteum cysts may be formed in the ovaries. If it is injected when the corpus luteum is removed, multiple ovulation may occur with the danger of twins or worse.

Antutrine "S" (Parke Davis & Co) or Urine Hormone supplied from the Madras Veterinary College, when injected being rich in gonodotropic hormones stimulate ovulation and induce oestrus.

Solution of Stilboestrol dipropionate in oil put in the market by Burroughs Wellcome & Co., and May & Baker Ltd., are synthetic oestrogens. Intramuscular injection of these preparations in doses of 10 to 20 milligrammes are said to stimulate the anterior pituitary resulting in the release of luteinising hormone and cause the rupture of mature graffian follicles. But in a quiescent ovary which is generally found in most of the cases of anoestrus, and contains no ripe follicles, it is said to be helpless as it is said to inhibit the follicle stimulating capacity of the anterior pituitary gland. Pregnancy Mare Serum (P. M. S. Hormone) is, therefore said to be preferable in such conditions. Although Stilboestrol dipropionate re-establishes regular oestrus-cycle, it does not bring ovulation with oestrus in cases where no mature follicles are present in the ovaries. It is, therefore, said that pregnancy may result if mating is carried out at one of the succeeding oestral periods.

Stilboestrol is also said to be capable of causing regression of persistent corpus luteum.

(ii) *Inflammatory and Traumatic causes*: (a) Cystic Ovaries—An ovarian cyst is a graffian follicle which has failed to rupture, usually fibrosed giving rise to toughened tunica albugenia which prevents ovulation. This follicle continues to enlarge. Lack of luteinising hormone also leads to this condition. Pressure of follicular fluid leads to degeneration and disappearance of the ovum. The large quantity of oestrin produced leads to nymphomonal symptoms. The treatment of this condition consists in the rupture of the cysts by digital pressure through the rectal wall. This operation

should be repeated in 7 to 10 days. A large dose of Prolan A in oil is also said to be effective in this condition.

(b) *Persistent Corpus Luteum*:—This should be extruded by digital pressure through the rectal wall. To prevent haemorrhage, it is advised to hold the ovary for a minute or two after the operation, applying pressure over the spot from which the corpus luteum has been extruded. Some hold that this operation may result fatally in a few cases, and therefore prefer to use Stilboestrol which is said to have the effect of regressing the corpus luteum.

(c) *Salpingitis*:—Inflammation of the fallopian tubes is usually secondary to pyometra or catarrhal Endometritis. Rarely this condition results from tuberculous peritonitis. In tuberculous salpingitis nodules are found along the course of the fallopian tubes.

Inflammation of the oviducts leads to thickening which can readily be detected on rectal examination and at the same time adhesions are contracted in the ovarian bursa. This condition is frequently met with in Brucellosis. Further adhesions tend to anchor the ovary and finally the lumen of the tube becomes obliterated. Salpingitis to any degree is serious, and when bi-lateral the case is hopeless. Efforts to open up the tubes again by means of air pressure, as has been done in women and mares, have not proved successful in bovines.

(d) *Inflammatory conditions of the Uterus*:—In the bovine uterus, the body is so small that it is of little importance compared with the horns. 1. Acute metritis, 2. Simple Endometritis, 3. Catarrhal Endometritis, and 4. Pyometra are the four diseased conditions of the uterus. The first is caused by the retention of the foetal membranes. In this condition the rectal examination reveals very little, except slight thickening of the uterine wall which may feel spongy and a little pus may be massaged through the cervix, while oestrus may be either regular or irregular.

In Catarrhal Endometritis the uterine horns get enlarged, there is a vaginal discharge, and the animal may not come into heat.

Pyometra is accompanied by a distension of one or both horns, which on rectal examination may be mistaken for pregnancy, although they are more fluctuant than in pregnancy. In some cases one or both the horns are so distended with pus that they fall forward over the pelvic brim and are scarcely palpable. Both catarrhal Endometritis and Pyometra are frequently complicated by salpingitis. Most of the cases of Catarrhal Endometritis are caused by Brucellosis, while most cases of Pyometra and some of catarrhal Endometritis are due to Trichomoniasis.

Pyometra is treated by the enucleation of the corpus luteum and injections of Stilboestral dipropionate. As soon as the purulent contents

start to discharge, the vagina should be douched with some antiseptic solution twice a day for 3 or 4 days until the discharge slackens. Then give an intra uterine injection of 100 c.cs. of 1.0% solution of Iodine.

(e) *Cervicitis*:—Inflammatory condition of the cervix is generally caused by either Endometritis or Vaginitis and occasionally due to the injuries caused during calving. Use the speculum and paint the visible cervix with a weak solution of iodine.

(f) *Vaginitis*:—Most of the cases of Vaginitis are secondary to infection, higher in the genitalia with or without discharge flowing over the vaginal floor; generally the trouble is secondary to metritis. In such cases, the vaginal mucosa assumes a roughened nature and a dirty pinkish yellow appearance. Various forms of primary vaginitis do occur and these include vesicular vaginitis or "Bull Burn" and granular vaginitis etc., which have been already dealt with above.

(g) *Persistent Hymen*.—This is also one of the rare causes of sterility but this can be treated surgically.

C Nutritional. (1) *Dietetic errors* viz., Irregularity or insufficiency of feeding. Due to lack of green fodder during the winter months, in the western countries, and the summer months in the tropics, animals do not come into heat generally during these periods. With the onset of the Spring in the West, and after the early showers which bring up green grass in the tropics, animals come into heat. This indicates that fresh green fodder has a stimulating effect on the reproductive mechanism. Several cases of anoestrus condition and silent Heat are brought round by nourishing food, green fodder and exercise. Germinating grain is also said to have a stimulating effect on indifferent breeders.

(2) *Mineral Deficiency*:—Some animals even without cystic ovaries show nymphamonical symptoms, such cases are usually due to vitamin and Mineral deficiency. In some cases, sterility is due to delayed ovulation, the ovum not being liberated until perhaps 5 to 7 days after oestrus, by which time the Spermatazoa have perished. This condition is due to mineral deficiency, and it is successfully treated by feeding Manganese Sulphate at the rate of 1 gramme per day. A 4% solution may be given in feed. In cases of some cystic ovaries in which the animals show nymphamonical symptoms, it is said that there is a depletion of calcium salts from bones, and it is therefore necessary to give such animals some calcium supplement to their feed.

(3) *Vitamin Deficiency*:—Vitamin E is said to contain stimulating effects on the reproductive mechanism. Wheat germ is said to be rich in this vitamin. Hence intramuscular injections of wheat germ oil are said to assist animals which are suspected to be sterile due to vitamin

deficiency, such as maiden heifers which do not hold service without any other apparent cause.

Sterility in the bull.

There is a tendency to often blame the female subject for causes of sterility. But in certain cases, sterility of the bull may be responsible for infertility in the cows served by him. It is, therefore, necessary to consider for a while the factors responsible for sterility in the bull.

1. Orchitis, (usually caused by *Brucella abortus*) 2. Cryptorchidism, 3. Adhesions in the Prepuce, 4. Lameness, 5. Adiposity and 6. Foreign body in the reticulum are said to be some of the main causes of sterility in the bull. The average number of spermatozoa per c. c. of semen in the bull is 800,000 but within normality, their number may vary from 300,000 to 1,200,000. The volume of semen ejaculated at each service normally varies from 2 to 8 c. c. the average being 5 c. cs. Any deviation from these normal limits such as low sperm count, sluggish movement of the spermatozoa etc., will lead to infertility in spite of the fact that only one spermatozoa is necessary to fertilise the ovum.

Antiutrine "S" Parke Davis & Co., is said to be useful in case of Cryptorchidism.

Injections of 25 c. c. of ascorbic acid solution containing 2 gms. of ascorbic acid is said to be helpful in slow serving bulls.

Urine hormone injections are very useful in indifferent servers. A Murrah Buffalo Bull was recently treated very successfully with Urine hormone in this district.

Ability to diagnose pregnancy in its early stages is absolutely essential to the Veterinary Surgeon who intends to undertake treatment of cases of infertility. Insistance on pregnancy diagnosis is essential since any treatment given is likely to induce abortion if the cow is pregnant. The onus of ensuring that a cow treated is not pregnant, is on the Veterinary Surgeon. It is therefore essential to carry out pregnancy diagnosis prior to treatment of any so called infertile cow, whatever the history given may be.

A complete examination of the cow must be carried out before any drastic treatment is undertaken, otherwise disastrous results in the form of abortion of a foetus or even death of the mother are likely to result. Some cows will continue to come into oestrus even when in calf, and have even been known to calve a few hours after being bulled. Therefore, full information should be obtained first on the following points:—1. Date of last calving; 2. Was it at full time? 3. Did the animal cleanse properly? 4. How many times has she been served and and when was the last time? 5. When was she in service last, and what

was the duration of oestrus? 6. Does she come into service regularly? 7. Has she been blood tested, and if so, with what results? etc.

Vaginal examination is then made. It is short and important, but it cannot be carried out in the heifer. It reveals the condition of the vagina, presence or absence of oestral or of abnormal discharge. Presence or absence of UTERINE SEAL—and the condition of the Oestrus.

Rectal examination is then made for a conclusive proof of pregnancy. A considerable amount of experience is necessary to become well acquainted with the anatomy and the feel of the uterus and its appendages in their normal condition, in the gravid state, and also in diseased conditions. For this purpose, the Veterinary Institution and the Slaughter house provide ample opportunities for the beginner.

The following technique is advised to gain a working knowledge of the subject.

"Clean the hands, pass the right hand into the vagina and examine Os uterus. If a vaginal speculum is available, examine the cervix with the aid of a torch light and have a visual idea of its normal condition in health. Then pass the left hand into the rectum a few inches deep and feel for the cervix which will be found as a hard lump below the rectal floor. Pass the hand further forwards feeling your way along the body of the uterus, the cornua, the fallopian tubes, and the ovaries. The ovaries are found just at the lateral margin of the Pelvic inlet within a distance of 18 inches from the vulvar opening. The surface of the ovaries may be felt carefully to see if there are any cysts, and also the corpus luteum. After examining a few cows in health, the practitioner can gain certain amount of experience in the feel of the genitalia. Some advise that the examination of the genitalia of a cow in heat is more helpful to the beginner as the uterus, the cornua and the fallopian tubes are said to be erect and stiff during this period. But the feel of such organs may give an exaggerated idea to the beginner. Then the practitioner can further improve his knowledge by antimortem and postmortem examination of cows at the Slaughter house where a large number of cows are killed perhaps on account of being sterile.

If the above technique is followed a fair working knowledge of the subject can be acquired.

Pregnancy Diagnosis

Pregnancy in the cow can be diagnosed at the fifth week. The enlargement in the pregnant horn of the uterus takes the form of a bulge rather than a uniform enlargement. The bulge occurs at the curvature of the horn, and in the corresponding ovary there is a corpus luteum of pregnancy while the opposite ovary has none. Without considerable experience an opinion as to pregnancy should not be given until 9 weeks after service.

If every one of us can acquire a working knowledge of pregnancy diagnosis and treatment of sterility, we as a profession, will be able to solve a great economic problem which is of vital importance to the country in these critical times.

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DISCUSSIONS

There was a lengthy discussion on the paper and some of the main questions asked were as follows :—

1. Mr. M. S. Anthony said that lotio Iodine injections into the genital passage cause immense irritation and that they should be avoided if possible.
2. Mr. Subramanyam wanted to be enlightened about the biological assay of urine Hormone.
3. Mr. Sankaranarayanan observed that any uterine injection is objectionable.
4. Mr. Narayana Rao asked why it has been advised that the right hand should be used for vaginal examination.

REPLY

The author thanked the audience for the keen interest evoked on the subject and the lively discussion that ensued.

1. In answer to Mr. Anthony's observation, the author said that he is in agreement with Mr. Anthony, but in cases of Pyometra where the Endometrium needs stimulation and revitalisation, some sort of stimulant is indicated. However, in the light of the recent advances made in the treatment of Pyometra, intra uterine injections of iodine solution

may be done away with and the desired effect can be had by (i) snipping off the Corpus Luteum, (ii) with intra muscular injections of Stilboestrol in oil and (iii) intra uterine injections of Sulphanilamide in Shark Liver Oil.

2. In answer to Mr. Subramanyam's query, the author said that urine of cows and mares during the later stages of pregnancy is rich in Gonodotropic hormones. By Zondoc's test, the unitary potency of this product can be biologically assayed. Such an assay can help the determination of the dose of urine that is required for injection. Parke Davis & Co., supply a product called "Antutrine 'S' " containing 600 International units of Gonodotropic Hormone per c. c.

3. In answer to Mr. Sankaranarayanan, the author observed that there is a tendency in these days to think that any form of uterine injections in the bovine subject, is unnecessary and harmful. But the author is inclined to feel that in certain septic conditions, uterine irrigations, with aqueous solutions is indicated and he doubts if any harm could be done by them if each solution is properly drained off by syphon action after each irrigation.

4. In answer to Mr. Narayana Rao's query, the author observed that, for the sake of convenience many leading clinician's advise that the right hand should be employed for vaginal examination, which is done first in the examination of a cow for sterility, so that he may then employ his left hand without further washing, for rectal examination. As the uterus and its appendages are on the right side, their examination, per rectum can be better done with the left hand. In order to avoid the washing of hands in the middle of the examination, the left hand is reserved for rectal examinations which is done later, and the vaginal examination is first done with right hand.

GOAT DERMATITIS :

A NEW VIRUS DISEASE OF GOATS IN INDIA*

By

J. R. HADDOW and J. A. IDNANI,

Imperial Veterinary Research Institute, Mukteswar.

This article describes the circumstances under which the disease was discovered, the main clinical features and post-mortem findings, the aetiology and possible means of control. Although the investigation is not complete, the present moment seems opportune to draw attention to the disease, so that it may be recognised and its incidence and epizootiology recorded, as at present we have no information on these points.

*Reprinted from the *Indian Journal of Veterinary Science and Animal Husbandry*, Vol. XVI, Part III, September 1946.

Occurrence

During studies on cross-immunity reactions using sheep and goat-pox virus strains, we observed that some of our discarded stock goat immunes were dying from an infection which was reported to be goat-pox. On going into the matter we found that, though this condition on casual examination might be mistaken for an aberrant type of goat-pox such as has not infrequently been reported in India, there were several easily recognised clinical features which made us doubt the accuracy of the original diagnosis. Simultaneously we discovered the same disease in goats which were being used on experimental work other than goat-pox, and reference to records yielded the additional information that a similar condition had existed at Muktesar in the healthy goat stocks on two previous years during the monsoon period.

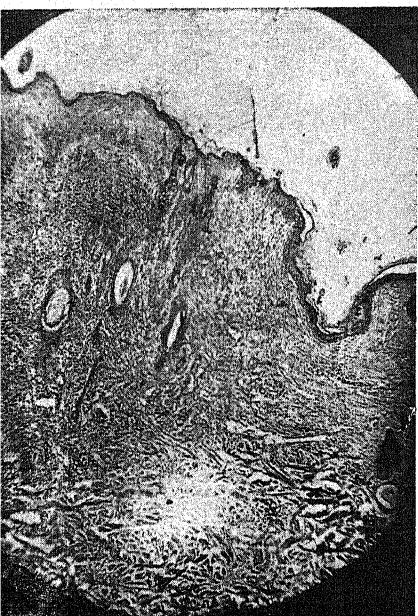
Since the investigation started, two outbreaks of goat dermatitis have been observed in the healthy stocks; both apparently arose from outside sources and both occurred during the monsoon. Also out of a number of specimens received at this Institute for confirmation of diagnosis of goat-pox, one originating in the United Provinces and reported to be from an outbreak of pneumonia in goats in Sind proved to be aetiologically identical with the condition which was under study at Mukteswar.

Clinical Symptoms

In natural cases the first symptoms observed are general malaise accompanied by a high temperature and rough staring coat. On examination, the skin is found to be studded with numerous round elevated areas distributed over the body surface (Plate X Figs. 1 and 2) and extending on to the lips, gums and tongue. Simultaneously or within a day or two, symptoms of pneumonia appear and death follows invariably.

In cases artificially produced by rubbing dilute emulsions of tissue from the stud-like nodules on to the scarified skin of healthy goats there is an incubation period of seven to ten days, after which the scarified area shows sharply circumscribed circular hyperaemic areas and simultaneously the temperature rises two to three degrees. The hyperaemia rapidly increases, the area becomes thickened and elevated, and within 48 hours there is a hard stud of rubbery consistence and black colour. The nodules are approximately 4-12 mm. in diameter and raised about 1-2 mm. above the normal surface. At no stage in the development of the nodules is there any vesiculation or pustule formation.

Within seven to ten days the tissue of the nodule becomes necrotic and is shed, leaving a shallow ulcer with a very clear-cut punched-out rim the floor of which is bright red and faintly striated. There is little pus formation and the floor of the ulcer gradually dries up and forms a scab which is strongly



3. Early stage of skin lesion. (Low power)



FIG. 4. Hypertrophy of cells in corium.



5. Necrotic skin nodule beginning to detach.



FIG. 6. Lung lesion. (Low power)

desquamated leaving the muscular layer exposed (Plate XI fig. 5). Staining of skin sections by Goodpasture's method has not revealed distinct inclusion bodies but some epithelial cells contain red-staining granular material. In the lungs, the lesion (Plate XI fig. 6) likewise starts as a proliferation of the epithelium lining the alveoli or bronchioles, followed by a monocytic invasion of the area with engorgement of the blood vessels. As there is no sharp fibrous or inflammatory demarcation between the affected and unaffected areas, bacterial infection apparently secondary in nature, soon occurs and the picture becomes that of an ordinary broncho-pneumonia. Where the lesions impinge on the surface of the lung, the endothelium of the pleura and its underlying tissue are also affected. In the kidney the cortical lesion is similar to that in the lung while the medulla is studded with haemorrhages. In the bowel, the lesion starts as in skin and extends to the deeper glandular layers.

Transmission

As stated, the disease was discovered almost simultaneously during the course of investigating another great disease and during experiments on typing of goat and sheep-pox strains. The former required serial passages in goats with blood inoculated subcutaneously, and the latter was done by scarification or intradermal inoculation. A clue thus presented itself that both blood and skin lesions were infective. Two strains were successfully established by serial passages in goats. Attempts made at the second generation to infect hill bulls showed these animals to be refractory. At the fourteenth passage, hill bulls, sheep, rabbits and guinea-pigs along with control goats were inoculated, but apart from the goats no other animal was affected. The lesions following scarification have already been described, the only difference in the case of subcutaneous inoculation being that, in addition to the usual lesions, swelling commences at the seat of inoculation within 24-48 hours and increases slowly to include all the surrounding fascia. On incision, the swelling is seen to be due to the formation of a yellowish gelatinous exudate. On intravenous inoculation the incubation period is reduced by one or two days.

Blood is also infective from the time the temperature rises until the temperature drops in chronic cases.

We have also to record negative results in transmission experiments with four Bhutia goats (a long-haired variety from the Himalayan hinterland). Whether these goats were naturally immune cannot be said, as these goats are only supplied to the Institute during the winter months. We have also no information as to the natural method of transmission in local breeds of goats. It is peculiar that, although the nature of the disease seems to spread readily enough, healthy goats have been left in contact with artificially infected ones at all stages of the disease for long periods without acquiring the disease. Later, they were found to be fully susceptible to artificial inoculation.

Aetiology

The circumstances in which the disease was found led us to suspect a virus as the probable cause and filtration experiments with emulsions of nodules confirmed this suspicion. Infective bacteria-free filtrates were readily obtained from Berkefeld V, Chamberland L1, L2, L3 candles. Cultural examination for bacteria at the early stages of the lesions was also uniformly negative,

The virus is present in the skin lesions throughout the course and has been recovered from the scabs more than three weeks after the original inoculation. Virus in dried scabs or in tissues stored in 50 per cent glycerol remains viable for atleast 16 months at 0-5°C.

Immunity

Cross-immunity tests with several strains of pox virus from goats and sheep and with the virus of contagious ecthyma of goats have shown that the virus now under consideration has no immunological relationship with these viruses. As already stated, all natural cases so far examined have been fatal. In our series of passages a few goats inoculated by scarification have survived and this led us to try the scarification of the skin of the ear as a possible means of inducing a non-fatal attack of the disease. So far, ten goats have been inoculated by lightly scarifying a small area on the inside of the ear. All showed a marked thermal reaction with local nodule formation. Six of these were available for test six weeks to two months after the original inoculation and all were solidly immune to an intravenous injection of skin nodule suspension. The serum of recovered goats possesses anti-viral properties and may be used in conjunction with virus to produce active immunity. The immunity following an attack lasts at least two years,—the longest period so far available for test.

Differential Diagnosis

The only description with which the disease under reference bears some resemblance is that of Wallace (1935), who during the course of investigation on contagious goat pleuropneumonia encountered high mortality due to what he termed 'atypical or stone-pox'. The skin lesions observed by Wallace were unlike classical pox and were probably similar to what have been described in this article. The absence of vesicles and pustules, the ease with which the virus can be filtered, together with the absence of cross-immunity reactions, and the presence of the virus in the blood stream for a prolonged period clearly differentiates this condition from goat-pox, while the widespread distribution of the skin lesions, the presence of typical nodules and the absence of cross-immunity differentiates this condition from contagious ecthyma. The presence of the nodules is of diagnostic significance in cases where confusion with other infectious or contagious pneumonias of goats might arise.

SUMMARY

An acute highly fatal disease of goats characterised by specific skin eruptions is described. At first, it was regarded as an atypical form of goat-pox, but detailed studies of the lesions and immunological tests have made it possible to recognise it as a separate disease entity.

The causal agent is a filtrable virus which is present in the blood and skin lesions throughout the course of the disease. It passes with ease a Chamberland L3 filter.

Following intravenous inoculation with skin material, symptoms of general malaise with high temperature, 104° - 106° F., and rough staring coat mark the onset of the disease. On careful examination the skin is studded with small circular elevated nodules distributed all over the surface extending to the lips, eyelids and tongue. Simultaneously of within a day or two, symptoms of pneumonia appear and death follows invariably. At no stage of development of the skin nodules does vesiculation or pustule formation occur. Extension of lesions takes place into the respiratory and alimentary tracts. Greyish white nodules are mainly seen in the lungs, abomasum and often throughout the intestines. The foci in the set up an apparently secondary pneumonia almost as quickly as they appear and produce early death. The disease was easily transmitted with blood or material from skin lesions subcutaneously, intravenously or by scarification to pox-immune goats. Bulls, sheep, rabbits and guinea-pigs proved refractory. Light scarification on the inside of the ear with the virus sets up a localised lesion and is suggested as possible means of prophylaxis.

ACKNOWLEDGEMENT

The authors desire to record their thanks to Dr. F. C. Minett for his interest and encouragement during the course of the investigation.

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THE Indian Veterinary Journal

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Vol. XXIV

MARCH, 1948 .

No. 5

Editorial

THE TASK AHEAD

With the dawn of Independence, a number of vital and urgent problems confront our country for immediate solution. One of the most important of such problems is the food problem and the feeding of the starving millions of the country. Poverty and Hunger are stalking the country and unless they are vigorously tackled with earnestness and skill, troublous times are ahead of us. As Aristotle very wisely said, Poverty is the parent of revolutions and crimes. And, therefore, a tremendous responsibility rests upon our Government and our Administrators in whipping up the Nation-building activities to dynamic action. The food crisis which has been threatening for the past few years is fortunately getting eased up, mainly due to the increasing imports from other countries. It is, therefore, of a temporary nature and cannot give room for complacency and satisfaction to those in power. Our aim must be to make the country self-sufficient in the matter of its food requirements. There must be plenty in the land and the common man must feel assured of freedom from starvation. Towards this end in view, the administration must gird itself for vigorous action. As the Food Minister said at the opening of the Seventh All-India Cattle Show in New Delhi in January 1948, the cattle problem is not merely a humanitarian problem of animal welfare; in it, are substantially involved both the health and wealth of our nation and the earlier we realise this the sooner shall we see the end of poverty and disease in this country. In the past, it had been a practice to mistake

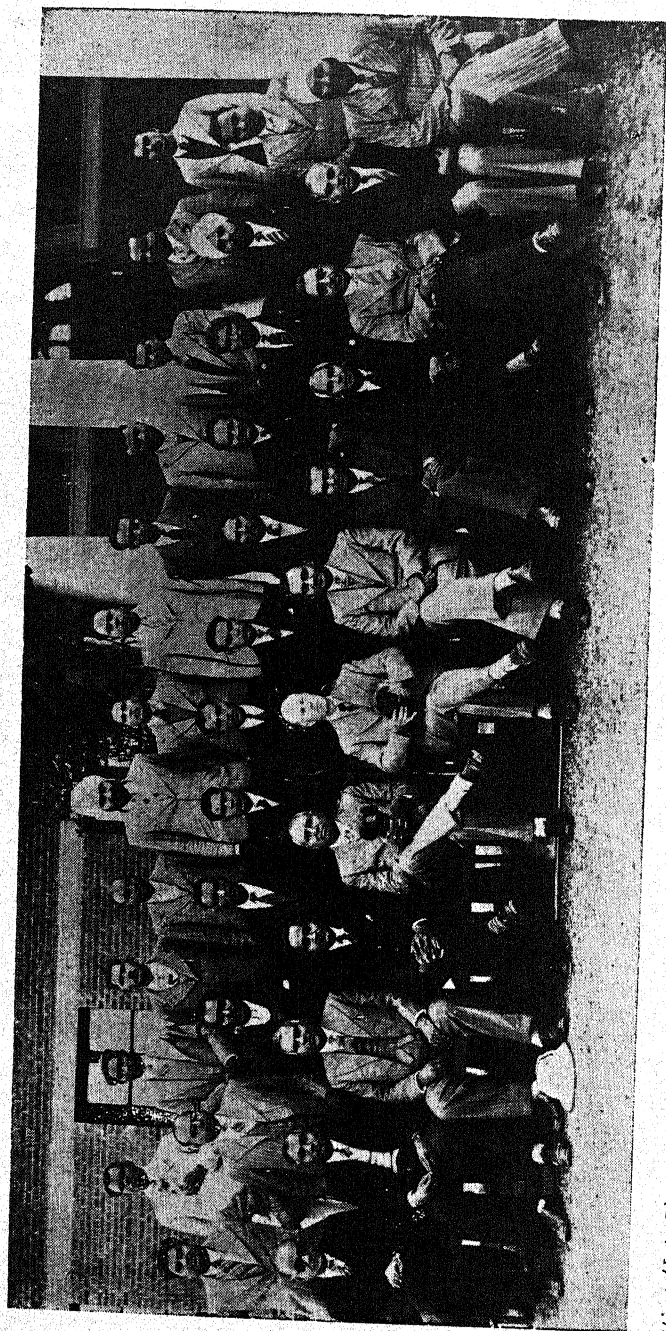
the normal inevitable growth of an organisation for a planned development and expansion, and some of those in charge of Departments like the Veterinary Department in the Provinces have in this way been laying the flattering unction to their souls that things have been progressing and that they were leaving the department better than what they found it. We had to pity such persons. Latterly, it has become the fashion to ignore all progressive ideas on the ground that the so called Post-war plans, said to have been drawn out elaborately, assured us of everything the country needs. As the proverb goes, the pumpkin sketched out on paper cannot possibly fill the belly. As such, what really matters is, not the planning of the schemes but the timely execution of those schemes and plans. It is only then that the administrations can make themselves really useful to the country. A timid, halting and hesitating approach to each and every question, a magnification of the inherent difficulties in them, and a strong disinclination to take a broad view of things is fatal to progress. They will inevitably lead to stagnation. Little or nothing can be achieved with such an outlook. The country has no use for persons with such an outlook and approach. The country is in a hurry,—in a tremendous hurry—to have things shaped out quickly and it needs a vital, dynamic approach to the pressing problems. Improvement of our livestock is a vital problem of a very urgent nature and it must be planned out with vision and fore-thought and executed with boldness and earnestness. The past neglect must be corrected, and the bullock which, as every one knows, bears on its patient back the whole economy of Indian agriculture, should be improved and developed in as short a time as possible. We earnestly appeal to the members of our profession, young and old, to realise their potentialities in effecting this improvement and, putting all other considerations aside, work for the progress and advancement of our people and country so that we can align ourselves with other advanced countries of the world in the shortest time possible in the wealth of our livestock.



S. VAIDYANATHA MUDALIYAR, G.M.V.C.,
*Who has been appointed as Ag. Principal,
Madras Veterinary College.*

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THE FIFTY YEAR RULE

Some time back we had occasion to comment on the order of the Madras Government banning promotion to gazetted ranks to Veterinary Assistant Surgeons who were fifty years of age. This order quite unjustifiably declared people as too old at fifty and had been passed, as the *Hindu* well put it, on no intelligent principle. It created a good deal of dissatisfaction amongst the members of the service who were eagerly looking forward to such promotions after long years of approved service. We are now glad to announce that the order has been cancelled and that the persons who were superseded on this account are now being gazetted as and when vacancies occur. We are very thankful to Madras Government for so graciously correcting the wrong.

APPOINTMENT

Sri S. VAIDYANATHA MUDALIYAR, G.M.V.C.

We are glad that Sri S. Vaidyanatha Mudaliar, G.M.V.C., Lecturer in Parasitology, Madras Veterinary College, has been appointed as Acting Principal of the same College.

We congratulate Sri S. V. Mudaliar on his promotion and wish him all success in his work.

Clinical Articles

VACCINIA IN CALVES

By

M. MAQSOOD, L.V.P., (HONS.), P. G. (MUKT.)

Lately of Civil Veterinary Hospital, Murree Hills, West Punjab.

Vaccinia or Cow-pox is a common, comparatively benign contagious disease chiefly of milch cattle, the lesions of which are mainly localized on the teats and udder, though rarely in buffaloes and cows generalized form of the disease had been recorded by Dupuis (1889), Strebel (1898), Blaxall (1930), Sharma (1935), Bhatia (1936) and Maqsood (1944). In calves pox lesions appear on the lips, muzzle and around the nostrils and in bulls often on the scrotum and inside the thighs (Hoare, 1913; Gaiger & Davies, 1938). Studies of the available literature show that there are not many records of naturally occurring cases of cow-pox in calves. In the following note four cases of naturally occurring cow-pox, observed in calves at Lahore and Murree Hills, are recorded.

Case reports

1. The subject—a grey calf, age about one month, was examined on 14th January 1943 at Lahore. It was stated by the attendant that on 12-1-1943 numerous reddish pimples were seen on the lips, muzzle and around the nostrils. The calf became dull and off food. The mother-cow was not suffering from cow-pox. On examination the temperature was 101.8°F . and vesicles varying in size from that of a split gram to a pea were seen on the lips, muzzle and around the nostrils. By the fourth day the vesicles became converted into pustules which dried up, forming yellowish scabs and later on brown crusts. The crusts became detached and the calf recovered in about 12 days. The depressed pinkish areas on the skin disappeared in about a fortnight.

2. A two weeks old red calf, was brought to the Punjab Veterinary College Hospital, Lahore, on 29th July 1945, with the history that on 23-7-45 numerous small pimples were noticed on the lips and muzzle and for the previous two days they had also appeared on the inside of thighs and in the scrotal region. The calf was dull with a temperature of 102.0°F : examination of the inside of the mouth did not reveal anything abnormal. Vesicles, about the size of a split gram, were seen on the lips, muzzle, around the nostrils and on the medial aspect of thighs. In the scrotal region besides crops of vesicles, a few papules were also present. On the 3rd day the vesicles had slightly increased in size and some of them became depressed in the centres. The temperature came down to 100.2°F . and the calf looked bright. By the 5th and 6th day the vesicles had converted into pustules, some of which became confluent forming small irregular areas, especially on the inside of the thighs. Gradually the

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pustules dried up forming yellowish scabs which finally changed into dark brown crust and on about the 11th day all the pustules had converted into crusts. Within a few days the dried crusts became detached, leaving the underlying areas of the skin pinkish in colour and slightly depressed in the centres. The calf recovered in about 2 weeks. On 29-8-1945 the calf was again examined, he was then in good condition and practically all the depressed pinkish areas on the skin had disappeared. The mother of the calf also was suffering from cow-pox.

3. A grey spotted calf, age about 20 days, was examined on 20th July 1945 at Lahore. As narrated by the owner, pimples in successive crops, were noticed on the inside of the thighs about a week previously and the following day they also appeared on the lips, and around the nostrils. On examination the temperature was 100.4°F . and the calf looked bright. Pustules about the size of a split pea were present on the lips, muzzle, around the nostrils and inside of the thighs. A few yellowish scabs were also seen on the medial aspect of the right thigh and the lower lip. The calf recovered in about 13 days. Lesions of cow-pox were seen on the teats and udder of the mother-cow.

4. The subject a light brown calf, age about 2 months, was brought to the Civil Veterinary Hospital, Murree Hills, Punjab on 14th May 1947, with the history that about a week previously groups of pimples appeared on the lips, muzzle and that the calf had become dull. On examination, the temperature was 100.2°F : the calf was feeding well. Numerous pustules with a few practically dried crusts were seen on the lips, muzzle and around the nostrils. The calf recovered in about 12 days. The mother-cow was also suffering from cow-pox, with lesions on the teats and udder. The owner also stated that the cow first developed the disease and, afterwards, the calf.

Cases No. 1, 2 and 3 were examined, while the author was working in the Pathology and Bacteriology Section, Punjab Veterinary College Lahore.

Course of the disease

In uncomplicated cases, it seems that the affected animals usually recover within 10 days to 2 weeks but in cases of secondary complications the course may be prolonged.

Diagnosis

The occurrence of eruptions on the lips, muzzle, around the nostrils and other parts of the integument, the fact that they passed through the various classical stages of pox, *viz.* papule, vesicle, pustule and scab, as well as the evidence mentioned in the next section, concerning the origin of infection in some of the cases and the experimental transmission of the disease to a healthy cow may be regarded as giving a clear diagnosis.

Epizootiology

As regards the source of infection in the cases under discussion, the following facts were ascertained. In case No. 2, the cow was suffering from cow-pox. The suckling calf probably contracted the disease from the mother-cow because the disease appeared first in the cow and it was observed in the calf about 4 days later on. In case No. 4, the calf contracted the disease from the affected mother-cow. The source of infection in cases Nos. 1 and 3 could not be traced, but it was stated by the attendant of case No. 3 that the disease first appeared in the calf and after a day the cow developed pimples on the teats and udder.

Experimental transmission

With a view to find out, whether naturally occurring calf vaccinia is infective to cows, a thick emulsion was prepared from material collected from the vesicles in case No 2 and was rubbed on the scarified teats of another healthy milch cow. It gave a reaction and developed pox lesions on the teats and udder.

SUMMARY

1. Four cases of naturally occurring Variola Vaccinia in calves are recorded and the lesions were present on the lips, muzzle, around the nostrils, medial aspect of the thighs and in the scrotal region.
2. The calf may contract the disease from the affected cow while suckling and the disease was experimentally transmitted to another cow which developed pox lesions on the teats and udder.

ACKNOWLEDGEMENTS

Valuable suggestions were received from Mr. S. I. A. Shah, M.R.C.V.S., P.V.S., the then Professor of Pathology & Bacteriology, Punjab Veterinary College, Lahore.

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ANTHIOMALINE IN THE TREATMENT OF INFECTIOUS GRANULOMA OF DOGS

By

B. S. P. RAO, G.M.V.C.,
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and

A. H. KHAN, G.V.Sc.,
Assistant Veterinary Surgeon, Hyderabad-Dn.

Anthiomaline—a lithium antimony thiomalate preparation by May & Baker—has been used by us in cases commonly known as 'Cancer' of sexual organs in dogs. The following are some of the clinical cases in which this drug has been tried :—

1. *Case O. P. No. 3806* :—A local bred dog with cauli-flower-like growths round the base of the penis and discharging foul smelling blood-stained discharge. The growths were removed surgically and the wound was cauterised with silver nitrate stick. A dose of Anthiomaline $\frac{1}{2}$ c. c. was then injected intramuscularly and the drug was repeated in 1 c. c. $1\frac{1}{2}$ c. c. and 2 c. c. doses every four days. The patient did not turn up later for treatment but it was learnt from the owner, some time after, that there was no bleeding from the prepuce subsequent to treatment and that the dog was doing well.

2. *Case O. P. No. 3127* :—A Golden Retriever, male, aged 2½ years. This animal had a history of having been operated upon two months previously in another hospital. The growth was therefore a recurrence and was not big and extensive. It was clipped with antiseptic precaution and the part cauterised. Anthiomaline $\frac{1}{2}$ c. c. was injected immediately and repeated thrice at an interval of 4 days, the dose being increased by $\frac{1}{2}$ c. c. every time. The treatment resulted in a complete cure and the dog later on mated with several bitches bringing forth healthy pups. Some of the pups which have grown up to adults now are noted to be free from this disease.

3. *Case O. P. No. 4533* :—Dog with a large growth about the size of a pigeon's egg, situated on both sides of the penis. The growth was removed surgically and Anthiomaline was injected as before. The injection was repeated every fourth day, in increased doses which resulted in a complete cure.

4. *Case O. P. No. 5307* :—Terrier, male aged 6 years. He was operated and 5 injections of Anthiomaline were given from 14—5—1947 and discharged. The dog was brought again to the hospital on 6—7—47, when the growths appeared to be diffused and granular. These were cauterised and another course of five injections of Anthiomaline were

given in 1 c. c. dosage. The dog came to the hospital several times later on for other complaints but a recurrence of the 'cancer' was not noted.

5. *Case O. P. No. 7006 of 13-8-47*.—Bitch. She had a big growth on the walls of the vagina touching the cervix. These growths were clipped and cauterised with a 1% solution of Silver Nitrate. A course of five injections of Anthiomaline was given as before and the bitch was discharged cured.

6 and 7. *Cases O. P. Nos. 3268 and 3269*. An Alsatian dog and bitch (pair) belonging to the same owner. Both were suffering from infectious granuloma of the genitals. The owner suspected that the male had crossed a vagrant bitch with this disease, which was roaming near his compound. The dog and bitch were operated and given a course of five injections of Anthiomaline from 6-2-47 and were discharged cured. Subsequently the bitch was crossed by its own male and littered thrice giving healthy pups.

Besides these, many other dogs were treated in this hospital, but they did not turn up after one or two injections. Therefore the results of treatment in them are not available.

ASTHMA IN A POMERANIAN BITCH

By

CAPT. G. VENKATANARUSU, G.M.V.C., P.G. (Mukt.),

Veterinary Officer, Gwalior Kennels, C. I.

An imported Pomeranian bitch, weighing about 5½ lbs., aged five years and in the enjoyment of good health in the plains, was taken during summer to a hill station at an altitude of 8,000 ft. high; after a couple of months stay there, it was brought back to the plains. This sudden change of temperature and altitude *i. e.* from the cold to the warm climate brought on an acute attack of asthma. The severity of the attack and its resultant threatening suffocation was more prominent on the slightest excitement as, for instance, when the pet ran up to her master to show all her affection. There was no pyrexia and the appetite was fairly normal. The wheezy and laboured respiration used to occur spasmodically and the animal had the characteristic prolonged dry cough. It used to stand with elbows abducted keeping the fore limbs wide apart. The hind-quarters were often brought in contact with the ground with the hocks semiflexed. A slight nasal discharge was always present. The fine coat of the animal became rough. The mouth had an offensive odour from the bad teeth which was covered with tartar in spite of

repeated brushing, cleaning and gargling. As the animal was getting weak, it was kept quiet with its movement restricted.

Treatment and observations:—The patient was kept in an airy dog-cage with equable temperature. A diet consisting of soup, soaked biscuits, minced mutton and fried fish was given. By way of treatment to begin with, a course of Liq. Arsenicalis, Tr. Digitalis with Tr. Nux Vomica was given for a fairly long period in small doses. This mitigated to a certain extent the recurrence of the attacks. Subsequently, very small doses of ipecacuanae, glycoheroin, glykeron, zephrol, and syrup glycodrin tarp. Vasaka gave temporary ease and comfort to the animal. Pot. Iodide mixtures and bromides were given a fair trial. Light ammonical stimulants were applied to the chest walls from time to time. In acute dyspnoea and distress coramine was administered both orally and hypodermically. When spasms became very extreme, relief was obtained by hypodermic administration of Adrenaline Hydrochloride 1 in 1000 solution, 2 ms. with one m. of Pituitrin.

All these treatments have been only palliative and the poor animal is still continuing to suffer from periodic attacks of the asthmatic complaint. She has lost nearly a pound of weight but is otherwise fairly well. Can any one suggest a radical cure ?

RINGWORM IN CALVES

BY

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Research Assistant, Provincial Veterinary Laboratory, Cuttack, Orissa.

An outbreak of Ringworm occurred amidst the calves of the Government Civil Dairy, Cuttack, in the month of October 1947 and a short description of it is given in this article. The scrapings from the skin revealed *Trichophyto* Spp. on microscopical examination.

Most of the calves affected with Ringworm showed typical lesions of the disease. The pathologic action of the invading fungus was clinically seen by the presence of circular, hairless, black patches, from the size of a pie to that of a Rupee coin, and even upto 8 to 12 sq. inches in diameter, on the surface of the skin. In a few days 13 calves were affected, mainly due to overcrowding. The infection showed itself gradually, in a few cases whilst in others, it flared up suddenly. The calves were allowed to mix with their mothers for a few hours in the day and penned together with the buffalo calves in the same enclosure ; but no infection was seen in them.

The gross pathological changes produced by the fungus were associated with the varying extension of the ever-widening, circular bare patches on the skin. The changes were brought about by a localised dermatitis caused by the fungi leading to loss of hair from the affected parts and gave a 'disfigured' look to the animal. The condition was aggravated by the animals rubbing the irritating lesions. Constant rubbing led at times to bleeding. The bleeding material was infective and when it came in contact with the neighbouring skin set up new lesions. In spite of the best nursing and feeding that could be expected in a well organised farm, the affected animals became devitalized. In the order of severity of the lesions, the parts affected were shoulder, ears, throat, face, dewlap, neck, head, back and rump. In a few cases lesions were seen throughout the whole body including the external genitalia (Calf Nos. 4, 6, 24 and 40).

Treatment:—The affected calves were segregated from the healthy ones. They were kept in three pens separately. The calves were bathed with soap and water on the day of treatment. They were muzzled with ordinary country-made bamboo muzzles to prevent licking and scratching during the course of treatment and these were removed only at the time of milking and feeding. These muzzles had the advantage that the muzzled calves could freely ruminate and take water but could not lick themselves or other animals.

Thirteen affected calves were treated with three sorts of medicaments as noted below:—

First lot:—Calf Nos. 7, 9, 10 and 24. They were topically dressed with the following ointment every fifth day.

R/-

Chrysophanic acid	...	1 oz.
Salicylic acid	...	2 dr. 40 grs.
Boric acid	...	2 dr. 40 grs.
Vaseline	...	1½ lbs.

M. ft. Unguentum.

5 to 7 applications gave a complete cure.

Second Lot:—Calf Nos. 6, 12, 16 and 19. The following ointment was applied over the affected parts of the animals at an interval of four days.

R/-

Chloral Hydras	...	10 gms.
Phenol, Crystal	...	15 gms.
Tr. Iodine	...	25 c. c.
Vaseline	...	1 lb.

M. ft. Unguentum.

The calves were given 7 to 10 applications and they were all cured.

Third Lot :—Calf Nos. 4, 14, 25, 27 and 40. They were given an intravenous injection of the following iodine solution every fourth day.

R/-

Iodum	...	20 grs.
Sodium Iodide	...	30 grs.
Sterile distilled water	...	1 oz.

This is stock solution of iodine. 3 ozs. of this was diluted with one pint of sterile distilled water and used for injection.

Each calf was given six injections of 40 c. c. of Iodine solution intravenously. No improvement was apparent.

Result :—In these three groups, group 1 recovered quicker and more completely. Chrysophanic acid is costly ; but, still, it gave the best results.

Chloral Hydras also gave equally good results, but required a few more applications.

Iodine injections did not prove effective, though they have been highly spoken of by many practitioners. Much care is needed to give it intravenously as severe local reactions are met with if the iodine solution gets into the perivascular tissues.

In my opinion, a local application of the drug is needed to produce more effective than parenteral administration. The ointments used in the first two batches gave quicker and better results because the drugs came in direct contact with the affected lesions by the vigorous rubbing.

The calves that were treated unsuccessfully with iodine solution were given a local dressing with Chrysophanic acid ointment. They were completely cured after 5 to 7 applications.

Acknowledgement .—The writer wishes to express his gratitude to Mr. G. B. Singh, M.R.C.V.S., Director of Veterinary Services and Mr. B. Rath, Investigation Officer, for their kind advice and help given in the treatment of these cases.

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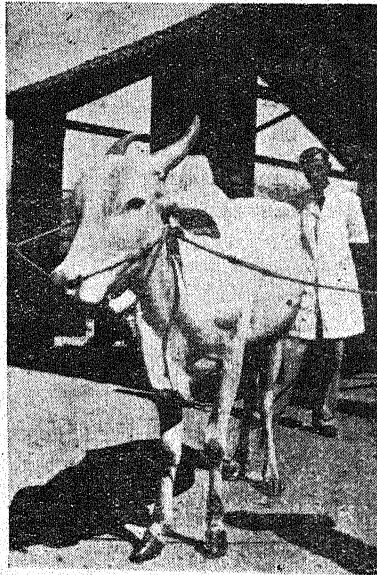
FREAK OF NATURE

A CASE OF SOLIPED BULL.

BY

G. C. KALE, G.B.V.C.,
Veterinary Surgeon, Dharwar, Bombay.

What may be considered as an exceedingly rare specimen of a case of Soliped Bull is illustrated in the enclosed photograph which was taken through the kind help of Mr. G. R. Kulkarni, Veterinary officer in charge Goat-virus sub-depot, Dharwar. The bull was brought to the hospital on 28th December 1947 for castration by the owner. It was purchased by him in the local cattle market about six months back. The parents of this bull are in Morab, about 15 miles from this place and there is no abnormality about them.



It would be noticed from the photograph that the hoofs are uncleft and solid only in the front legs while they are cleft and natural in both the hind legs. The gait of the animal is for all practical purposes normal.

This is the solitary case I have met with in my practice of 28 years' and I am sure it will interest my brethren in the profession.

BOVINE NASAL SCHISTOSOMIASIS-A RECORD OF TREATMENT CARRIED IN DHARWAR DISTRICT IN 1942-43.

By

G. C. KALE, G.B.V.C.,

Veterinary Assistant Surgeon, Haveri, (Now At Dharwar).

Introduction :—The disease is very greatly prevalent in Haveri, Hangal, Hirekerur, Ranebennur and part of Bankapur Talukas of the Dharwar district. In most of the villages in Hangal Taluka, not less than 25% of the cattle population is affected with the disease. In these villages, ponds, pools, and the river Wardha where the village cattle are watered, are the main sources of infection. These waters are infected with snails of the genera *Helix* and *Indoplanorbis Exustus* which are the intermediate hosts of the parasite *Schistosoma Nasalis*. Animals pick up infection with the cercaria of *Schistosoma Nasalis* while drinking water from them.

Affected animals were treated by the writer and some of his colleagues in the past with Tartar Emetic in the Dharwar and Belgaum Districts. But the treatment was not given systematically until complete cure was effected, mainly due to absence of co-operation from the cattle owners.

Subsequently, Mr. R. N. Naik, the then Veterinary Investigation Officer, Bombay Province, under instructions from the Director of Veterinary Services, Bombay, first took up a systematic experiment to treat the cases of Nasal Granuloma by the intravenous injections of Tartar Emetic in Shirbadagi, a village in Haveri Taluka in my charge, in the year 1939. The results obtained by him were very encouraging. I had an opportunity to check the results of the treatment carried out by him and the whole village was thankful to the Department for having cured their valuable animals. They treated the ponds with Cupri-Sulph and thus the infection was controlled. This gave me an impetus to start the work in some other centres, and this was followed up by me in my dispensary, as a routine course, according to the instructions given to me by my colleague Mr. R. N. Naik. The results were satisfactory. With the permission of the Director of Veterinary Services, Bombay Province, I took up the work independently in four villages, where the people, after seeing the good results of the experiment carried out at Shirbadgi, were very eager to get their animals treated.

Antimony Tataratum Solution :—This was prepared according to the instructions of the Veterinary Investigation Officer, by dissolving 60 grs. of Tartar Emetie in 65 c.c. of distilled water, which yields a 6% solution. The solution required every day was prepared afresh, sterilised on a water

bath and filtered before use. The dose of the solution given intravenously was 1.635 c.c. per 100 lbs body weight, and this was given for six consecutive days.

The injections were given with a 20 c.c. Record syringe using a fairly long 3" needle and taking aseptical precautions to see that there was no subcutaneous infiltration of the solution. All the injections were carried out in recumbent position except in a few docile animals, which received the injection in standing position successfully without any untoward results.

In all 145 animals were subjected to the treatment in 4 villages, *viz.* Devagiri (34), Sangur (58), Singapur (28) and Benchihalli (25).

These villages had a number of cases affected with the disease for periods ranging from 10 to 15 years. While carrying out the treatment, the writer once through oversight, injected 7 animals with double the strength of Antimony Tartarate in the same quantity of water; fortunately none of these animals showed any toxic symptoms of the drug. These were not injected the next day, like the other cases, but on the third day along with others,

To avoid mortality due to the cumulative action of the drug, the author went very cautiously after the 4th injection. At Devagiri, he gave the full course of treatment for the 34 animals without any ill effect. In the other villages which were taken up subsequently, all the animals had more than 3 successive injections: after that, on account of the irregularity on the part of the owners, only a few animals were given the full course of treatment. Majority, however, had 3 to 5 injections. Even with this incomplete treatment, all animals, except a few chronic ones, showed satisfactory results.

Out of 145 animals, only 12 showed dullness and went off feed after the 3rd or 4th injection. There was 1 death at Sangur, and 2 deaths at Benchihalli. All these fatal cases had only 4 injections and on the 5th day they died suddenly.

Results:—The results of the treatment were checked by me after about 5 months. Cure was noted in 90% of the treated animals. The villages who were until now under the impression that the disease was an incurable one were quite satisfied with the treatment. The animal too began to pick up conditions as time went on. Consequently, some cultivators in these villages used to purchase affected animals at a low price, from interior villages, get them treated at the dispensary, and, when cured, sell them for a profit.

General remarks:—As the source of infection has been proved to be the snails of the genus *Indoplanorbis Exustus* in the ponds used for watering the animals, it will be of more advantageous to destroy these

snails by treating the ponds with Copper Sulphate and break the life cycle of the parasite *S. nasalis*. The ponds should be treated once a year after the rains. If this is done for about 3—4 years regularly, the writer is firmly of opinion that the disease can be stamped out in a very short time. A scheme for the treatment of affected animals must also be seriously taken up simultaneously, in the interest of dumb animals, as an aid "To grow more food campaign" and to preserve the health of the cattle, which is the national wealth.

Acknowledgements:—The writer is indebted to Major E. S. Farbrother, M. R. C. V. S., Director of Veterinary Services, Bombay Province, Poona, who allowed him to carry out the experiment independently and also to Mr. S. R. Chadha, M.R.C.V.S., the then Disease Investigation Officer, Bombay Province, Poona, who personally checked the results. He is also very thankful to Mr. R. N. Naik, G.B.V.C., now Bacteriologist, Bombay Veterinary College, for helpful instruction and to Mr. G.R. Kulkarni, G.B.V.C., (now Officer, I/C Goat Virus Sub—Depot, Dharwar) for rendering technical assistance at Sangur and Singapur, when the above course of injections were carried out in 1942.

SPIRITUS METHYLATUS IN YOKE GALLS

By

F. C. BHUYAN, G.B.V.C.,

Veterinary Assistant Surgeon, Nowgong, Assam.

In Assam, Yoke gall and inflamed neck is the commonest affection of draft cattle and buffaloes. It is caused mostly by 'bad yoke' and is met with in all seasons of the year. It causes great dislocation of work to the agriculturists to whom bullocks are the chief source of power. An effective treatment of these cases of yoke galls is always sought after so that the animals are brought back to work in as short a time as possible. With this object in view, during the last three or four years, I have used Spts. Methylatus in over 25 cattle and buffaloes with very satisfactory results. Nearly 75 per cent of the animals were cured and rendered fit for work in a surprisingly short period of time. And therefore I am recording my experiences below with details of the cases treated.

The first case was a cart he-buffaloe with a big inflamed neck as big as a cocoanut. It had resulted from carting a heavy load over a Kacha road for a distance of about 20 miles. The yoke region was very much inflamed, hot and painful, as is usually in these cases.

Treatment:—I injected Spts. Methylatus along the base of the inflammation in two places in doses of $2\frac{1}{2}$ c.c. at each place and asked the owner to keep the animal at rest for atleast four days. When examined on the

fifth day, the inflammation had become reduced to one-third and almost all the pain had disappeared. The animal could bear some pressure on the part and it was also able to move the neck fairly freely. No further treatment was given and the owner was asked to get the animal for a fortnight. By this time, all the inflammation had subsided and there was no trace of the original trouble. The animal was put to work after that period and there was no recurrence.

This first case gave me encouragement to try the treatment in other cases. As mentioned already, 35 animals were treated in this way. Only one injection was found sufficient; a few cases however required a second injection after 4 or 5 days. The dose of the Spts. Methylatus varied according the size of the animal, and the extent of the inflammation from $1\frac{1}{2}$ to 2 c.c. in bullocks to $2\frac{1}{2}$ to 3 c.c. in buffaloes given on each side of the inflammation. The treatment was uniformly successful in all cases, except in six cases. In these cases, suppuration had taken place already and the failures were therefore due, in my opinion, to this complication.

This line of treatment has been found by me to be the best I have tried all along and I wish my professional brotheren give it a fair trial and publish their experiences in the columns of this *Journal*.

This line of treatment may also be worth a trial in affections of a similar nature on the back of the elephant called "Marag" which is caused by the bad 'howdah.'

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Receipt and Payment Account for the year ending 30th June 1947.

(Volume XXIII)

ACCOUNTS OF THE I. V. J.

355

	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
To Opening Balance				
Fixed Deposit as on 1-6-46	5,000 0 0			
Cash in hand	411 3 11			
Subscription	...	5,411 3 11		5,867 8 7
Advertisement	...	5,962 7 10		1,277 5 0
Reprint of old issues	...	2,196 12 0		480 0 0
Interest on Fixed Deposit	...	269 8 0		880 0 0
	...	150 0 0		123 0 0
				10 8 0
				25 0 0
				1,000 0 0
		13,989 15 9		
By Printing and Stationery (Including Block Charges) ...				
Postage				4,000 0 0
Rent				326 10 2
Salary of the clerk				
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Audit Fees				
Honorarium for the Editor				
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Fixed Deposit				
Cash in hand				
				4,326 10 2
				13,989 15 9

Examined and found correct.

20, Thambu Chetty Street,
G. T. MADRAS,
18th March 1948.

K. GOPALKRISHNA RAO,
Registered Accountant & Auditor.

Correspondence

[The views expressed in letters addressed to the Editor represent the personal views of the writer and must not be taken as expressing the opinion or having received the approval of the A.I.V.A.]

Sir,

IMPROVEMENT OF LIVESTOCK IN TANJORE DISTRICT

The Tanjore District, rightly known as "the Granary of South India" could enhance her reputation by improving her cattle. For an intensive and extensive agricultural district like Tanjore, cattle are the pillars of prosperity cannot be maintained if the equilibrium between land and animal is upset by unequal emphasis or attention of one and neglect of the other. The present day craze to bring more and more land under the plough is robbing the already semi-starved cattle of the little grazing ground that is available and this District stands a chance of becoming "a land with no cattle". Such a catastrophe can be avoided and I therefore propose to give a short survey of the District and its cattle with suggestions for improvement.

The Tanjore Delta lies in the temperate part of the tropical zone, with plenty of rain from October to January and a few good showers in the summer months. Except parts of Tanjore, Pattukottah and the whole of Arantangi Taluks and the Vedaranyam forests of Tiruturaipundi Taluk, the District is an extensive water logged area. With the further expansion of the Cauvery-Mettur project, a large part of the day Taluks also have come under wet cultivation.

According to the census of 1944, the livestock population is follows :-

White Cattle		Buffaloes	
a. Breeding bulls	2,408	a. Breeding bulls	1,896
b. Male stock	4,34,731	b. Male stock	43,394
c. Female stock	3,26,301	c. Female stock	1,34,115
d. Young stock	2,30,955	d. Young stock	69,837
Total	<u>9,94,395</u>	Total	<u>2,49,342</u>

Sheep 1,70,032; Goats 3,88,666; Horses 1,595; Donkeys 1,476.

A good percentage of the cattle of the District is of a mongrel type. They are grossly underfed and overworked. Consequently the work turned out by them is poor. The milk yield is very low, scarcely enough to feed the young calves. In addition to these mongrel cattle, there are a limited number of cattle belonging to the Umblachery and kindred breeds. These are indigenous to this area. If these animals are well cared for, there is no doubt, they will excel all the other breeds in utility.

Condition of the soil and water :—The soil of the District has been very much depleted of its calcium and phosphorus by the continuous and intensive cultivation with practically nothing added to make the loss except what nature has been pleased to add. The water is wholesome and good since the main service is from the branches of the Cauvery.

Fodder and food-stuffs :—"Communal grazing consists of land to which everyone in the village has an actual or an accepted right. This comprises of communal lands set apart for the purpose of unassigned waste land, of tank beds, the sides of the drains, roads and other perumbokes—usually also of harvested wet lands and of dry lands which have been left fallow" says K. W. Littlewood in his "Livestock of South India".

It is interesting to note, that in this District, though grazing is resorted to in places where everyone has a common right, almost all the abovementioned sites are not available for grazing. Under the Grow-more-food campaign, no land within the reach of canals is allowed to mean waste. Even the high-level uncultivable lands have been brought under cultivation. The rich river bunds are used for the raising of profitable cash crops like bamboo and casurina. In Pattukkottai taluk alone these crops are raised over about 4390 acres.

During pre-war days the wet fields after harvest were available for grazing from January to June. But nowadays, even these months of mercy have been snatched away from the animals. The ryots have taken to the cultivation of green and black-grams, green manure, etc. etc., in pursuance of the "Grow-more-food campaign".

During the agricultural season the cattle are tied up in their sheds or they are taken along pathways and road sides in search of grazing which for all practical purposes, is nothing. Their main feed consists of straw. This is supplemented by cotton seed, oil cake and rice bran in the case of draught bullocks and good milch cows. The plough cattle are given a limited ration of these during the ploughing season. During the off season these and the rest of the cattle have to depend only on paddy straw. No attempts have so far been made to grow fodder crops of any kind.

As a result of these factors, the cattle of this District suffer from mineral and nutritional deficiencies—and fall an easy prey to contagious and parasitic diseases. Their growth is stunted, and their bones are fragile. The heifers do not come to heat till they are about six years of age. Twenty percent of these do not conceive at all and those that conceive do not bring forth more than one or two calves in their life time. Their progeny on the whole is poor. The interval between successive heat is about three to four years. Freaks of pregnancy are not uncommon so also cases of congenital blindness, etc, etc.

Suggestions for the Improvement of Livestock

Control of contagious and parasitical diseases:—Livestock improvement depends on the successful control of the contagious and parasitic diseases. As in other parts of India, the Tanjore farmer also depends on the quantity rather than on the quality of his animals for his agriculture. There is not enough fodder for these cattle. They are underfed and easily become a prey to all diseases. As we are in a position to control all cattle diseases the ryots need not maintain large numbers of cattle. Active steps must be taken immediately to this end.

Grazing facilities:—About four to five acres of grazing land is necessary for every animal but in this District, for every acre of waste as well as cultivated land, there are about $1\frac{1}{2}$ animals on an average. The grazing facilities are very inadequate. Round about Thambikottai and in the dry parts of Arantangi and Pattukottai Taluks there are some tracts which can be converted into good pasture lands. Kolukkattai grass and fodder cholam can be raised in these areas as cattle fodder. The marshy tracts from Thambikottai to Adirampatnam can be converted into beautiful pastures if the land is properly drained by taking the canals direct to the sea. The land, when properly drained, can be turned out as a permanent pasture land. Some exotic grasses also may be introduced. The introduction of the paddock system of grazing in these tracts will prevent over-grazing.

Fortunately two-thirds of Pattukottai and almost the whole of Arantangi Taluks have not yet been brought under wet cultivation. The grow more food campaign in vogue aims at converting most of these lands for paddy growing. The irrigation aimed at, may be made use of for raising cattle fodder extensively and also for raising the various dry crops. Dry cultivation not only affords facilities for "Grow more food campaign" but also yields useful cattle fodder at a reasonable cost; Deep wells will have to be sunk in the dry tracts. This can be encouraged by subsidies. Letting in of the canals will go a long way in raising the sub-soil water level in dry areas.

Forest grazing for the delta cattle:—The big cattle owners of the district at the present day are forced to send their animals to the forests for grazing. This is due to their inability to find grazing for their cattle for almost six months of the year, when the fields are full with the paddy crops. Indian forests are over-grazed and it is mainly due to the letting in of numberless cattle on these areas without any systematic procedure. Grazing area will have to be calculated on the approved calculation of 4 to 5 acres per animal. Definite areas have to be marked out for the recognised breeders under permits in the above calculation.

Forest grazing should be reserved only for those cattle that are fit for breeding. These cattle will have to return to their native home, so that they may retain in them their adaptability to the paddy growing deltaic area. Under proper planning of agriculture, grazing facilities will be available for these cattle in their native lands from about February to June (the fallow season).

Control of cattle food movement :—This is a deficit district in point of concentrated cattle food. It should therefore be able to import the necessary quantity from outside. This District exports a considerable quantity of rice-bran and also straw to the adjoining districts, States and also to Ceylon. Statistics about the total output of bran in this District and also the quantity of exported to outside areas are not available at present. The proper preparation and preservation of the straw and the necessity to limit its exports calls for immediate action. Careless preparation and stacking of the same leads to much waste of this material and creates much dietetic trouble in animals when fed with. This District exports also a considerable quantity of cocoanuts and groundnuts.

The two reasons that can be put forward for the little interest shown in the growing of cattle fodder crops are the levy of kist and the indifference shown by the mirasdars in the scientific and economic maintenance of their cattle. The removal of kist will certainly induce the ryots to take to the growing of cattle fodder, so essential for the improvement of the livestock of the land.

Doing away with the surplus useless stock :—The call to do away with India's surplus useless cattle, has been voiced by one and all interested in livestock improvement. I do not believe that this procedure can ever be counted as "killing the goose that laid the golden eggs". India has one-third of the world's livestock population. She can very well part with her useless cattle, in exchange for food grains. This procedure will develop a big industry. We stand in need of enormous quantities of bones for manure as well as for cattle feeding. The hides of these animals will also be a valuable asset to India.

Selection of breed and stock raising.—The importance of selecting the foundation stock in a certain area and maintaining it with due consideration for the climatological conditions that may exist in that area are well known.

Livestock improvement work at present in vogue in this district consists of introduction of Kangayam bulls under the District Board contribution scheme and Government premium scheme and the Umblachery cattle breeding activities. The Umblachery breed thrives well on meagre rations and is a hard worker and swift runner. There are other breeds like Komal,

Karapidagai, etc., which are equally good, and which are also akin to Umblachery. Any deterioration that may be noticeable in this breed has been solely due to the neglect and want of proper care and management. The demand for good cattle in the district can be met only by improving this breed by careful selection and breeding and this can be done by opening cattle breeding stations in the District and by organising the Kidai system. The army personnel in the District can be organised to undertake stock raising on a co-operative basis with subsidy from Government. In the whole of this District there may be 100 pure Umblachery bulls and a good number of female stock of this breed at present. Though this breed cannot be termed as a milk type some of these cows have yielded from ten to sixteen seers of milk per day.

The Kidai system is a system which is peculiar to this District and has been in existence for a very long time. Owners of good bulls collect the cows in the locality during the off cultivation season and move from place whenever grazing facilities are available. This system could profitably be extended and modified as follows :

1. Farms with extensive grazing areas should be established in the areas described previously.
2. Only pure Umblachery bulls should be made available for service.
3. Instead of collecting cows indiscriminately, Veterinary Assistant Surgeons should be deputed to visit the villages and select only the animals fit for breeding purposes.
4. The cows should be registered and tattooed or otherwise marked for easy identification.
5. Such of the cows that belong to owners who are willing to leave the cows permanently in the farms can be retained. In exchange the owners may be given all the male progeny that may be born at a minimum cost.
6. A small fee for the season may be collected from those who want their cows back. These cows should be re-admitted into the farm next year only after inspection.
7. A limited number of pure cows should be maintained permanently at the farms for producing good breeding bulls.

Artificial Insemination may be undertaken to overcome the paucity of breeding bulls. Many cows come into heat after the rains, when good pasture becomes available and it should be possible, in farms suggested above to impregnate many cows at a time by artificial insemination. There is no doubt that, given the proper equipment and facilities, it could be a success here also as has been found in other countries.

The present high demand for milk and milk products is such that we cannot hope to meet these needs by any intensive improvement of local breeds for many years to come. Hence the maintenance and improvement of the available foreign breeds and Sindhis in this District has to be considered. About 600 Cross-bred cows and Sindhi cows and a few cross-bred English and Sindhi bulls are available at present. The neglect of the animals, especially of dry cows by their owners, has resulted in their rapid deterioration and the only practical way to solve this is to start a Salvage scheme in this District on the lines similar to the Madras City Dry Cows Salvage Scheme. The dry tract available in Tanjore Taluk especially the Vallam area can very well be utilised for this purposes. It is necessary to emphasise in this connection that the local indigenous stock other than Umblachery has to be graded up by Sindhi blood. We cannot ignore the poor man's buffaloes to meet the milk demands of the public. Most of the milk products are only derived from these cattle in the poor man's as well as in the rich man's home. These semi-aquatic animals thrive very well in these District areas. We may improve the stock with the introduction of Murrah bulls. We have to bear in mind at the same time that we should not grade them to a high level.

Mannargudy,)
Tanjore Dt.)

GEORGE EBENEZER,
Veterinary Assistant Surgeon.

A VETERINARY COLLEGE FOR ASSAM

Sir,

I request the favour of your kindly publishing the following in your esteemed paper.

It is reported that nearly 70 M.L. As signed a pledge and demanded the Government in November, 1947 that the proposed Veterinary College to be located in Nowgong, and the Government consented to it. Accordingly the Hon'ble Minister incharge deputed the Veterinary Director during last Muharram holidays to make necessary arrangements which the Director did, as the Nowgong public gave all required facilities for starting the College. The first-Year Class was to start from 1st February, 1948 in the College.

But at long last the curtain has dropped. It is extremely painful to learn that in the nick of time our Govt. has referred the matter to the Central Government. It is extremely difficult to understand the real intention as to why the Govt. has referred the matter in the nick of time to the Central Govt: ? Is it ingenuity of our Hon'ble Finance Minister (who declared in Boko Speech that the Veterinary College would be starting at

Gauhati) to waive the whole project? Or, is it only because of the fact that there is neither provision of a Veterinary College in Post-War Scheme, nor any provision for imparting Veterinary education in the Gauhati University? It is to be noted here that East Bengal Govt. has already started a new Veterinary College at Comilla from October, 1947 to train their Veterinary Doctors.

Now the Govt: owe an explanation to the public how they are going to utilise over 40 lacs of rupees allotted to the Post-War Scheme of which pactly 2 years have already gone and allotted money is also lapsing without materialising a single project for want of trained Veterinary Doctors. Besides this we are surprised to find in Grow More Food Campaign nothing is done towards the provision of adequate Veterinary aid and to improve the cattle which are the main implement of the cultivators, and without good plough bullocks the whole campaign will nip in the bud.

Further it is reliably learnt that the Post of the Superintendent of Veterinary Vaccine Depot Gauhati, lately sanctioned, is going to be filled up by a non-Assamese in superseding the claim of deserving qualified Veterinary Doctors.

Yours faithfully,

Nowgong, }
1-3-48. }

RATNA KANTA BARAH, B.L.,

Pleader.

Abstracts

Indian Cattle in America.—Several varieties of Indian cattle have been imported into the U. S. A., particularly from Gujerat. The animals are known in the U. S. as "Brahman cattle". The first import took place in 1850 to South Carolina, Later on imports followed to Louisiana. Out of climatic reasons, Indian cattle is nowadays used in the Southern States of the U. S., e.g., the coastal districts of Texas and in Florida. The animals are well adapted to the climate prevailing in this part of the world and stand heat extremely well. They are indifferent to insect pests. They are good feeders and propagate regularly. Other writers comment on certain drawbacks of Indian cattle. Lately, however, much has been done to improve the race by cross-breeding to increase the unpopularity as animals for agricultural work. (C. H. Herweijer, *Nederlands Indische Bladen Voor Diergeneeskunde*, October 1947).—Dr. Br.

Streptomycin in Experimental Infections and its Possible use in Veterinary Therapeutics.—By Alfred G. Karlson and William H. Feldman (*Jour. Amer. Vet. Med. Assoc.* Vol. CX. Page 63-70.)

The success of penicillin has stimulated intensive search for other antibacterial agents and the discovery of Streptomycin was the result of organised efforts by Waksman and his colleagues to find an antibiotic substance capable of exerting its effect on Gram-negative bacteria and acid fast micro organisms. The authors have described the characters, method of standardization, dosage, mode of administration and experimental studies of this new antibiotic from the available literature. The role of Streptomycin in Veterinary practice was discussed briefly.

Streptomycin has been pointed out to be having a bacteriostatic action on a wide varitey of bacteria *in vitro* in low concentration. Among those of importance in animal diseases are the tubercle bacillus, members of the Salmonella and Shigella groups, Staphylococci, and hemolytic streptococci, *Brucella abortus*, *Actinomyces bovis*, *Erysipelothrix muriseptica*, *Bacillus anthracis*, and *Pasteurella tularensis*, *Malleomyces mallei* is found to be quite resistant to Streptomycin *in vitro* and this drug has apparently limited activity on spore-forming anaerobes. Experimental trials in *Tularemia*, *Brucellosis*, *Leptospiral jaundice* are reported to be quite encouraging. This antibiotic has been found to be not active against fungi, *Trypanosoma equiperdum* and parasites of avian malaria. It had no effect on the few viruses tried and had not inactivated tetanus toxin. Clinical experiments of this drug in *Tuberculosis* have so far been reported to be very successful.

The authors preface their discussion of the role of Streptomycin in Veterinary Medicine with a plea of caution of the wide gap of knowledge concerning chemotherapeutic agents and their use in animal diseases. They point out that much of the information is borrowed from experience in human medicine, without being critical of the anatomic and physiologic differences among mammals, and that very little is known about the dosage, absorption, toxicity, elimination and effectiveness of some of these new agents in animals. They deprecate the practice of trial-and-error method without adequate experimental data. The authors emphasise that the control of infectious diseases in domestic animal should be based primarily on prevention and which requires the application of hygienic principles first and immunologic procedures secondly.

It is pointed out that one of the limitations of the use of Streptomycin in Veterinary practice is requirement of frequent dosage to maintain high blood levels. This may not be of importance in hospitalized cats and dogs, but for farm animals it is obviously not economically feasible. The apparent ease with which certain micro-organisms acquire resistance to Streptomycin

is another important factor to be considered in treating transmissible diseases in animals.

Barring all these limitations, the drug is suggested to be useful to treat, valuable animals from bovine brucellosis although the experience in human beings suggests that the chronic form of the disease does not respond satisfactorily to streptomycin therapy. The high concentration of this antibiotic in urine suggests that pyelonephritis in cattle may be effectively treated with streptomycin after suitable bacteriological examination. *Actinomyces bovis* is inhibited by streptomycin *in vitro* and *Actinobacillus lignieresii* being Gram-negative, it may also be susceptible to this drug. But the granulomatous nature of the disease would suggest a long treatment with an adequate concentration or such treatment combined with surgical intervention.

The slow rate of absorption from the intestinal tract by oral administration makes the drug suitable for extensive application, despite its high cost, in poultry practice as a prophylactic measure against common diarrheal diseases of chicks and poults. Streptomycin has been pointed to be a valuable adjunct to penicillin in the treatment of mixed infections of bovine mastitis especially when staphylococci are present, and in the acute and dangerous types due to gram-negative bacteria. The alkaline reaction of milk from the inflamed gland is suggested to be a suitable medium for the activity of this antibiotic.

Since the supply of the drug is very limited, the authors suggest that the antibiotic should be made available only to those group or groups of workers who, by virtue of experience with a given disease, are best qualified to evaluate its use and disseminate the information thus gained to the profession to provide the basic knowledge for its proper use. (D.K.M.).

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General Articles

ON THE USE OF TISSUE-FREE MEDIA FOR THE PREPARATION OF BLACKQUARTER VACCINE:

(I) CYSTEINE HYDROCHLORIDE BROTH:

(II) ACID DIGEST OF LIVER AND MEAT*

By

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Immunisation against blackquarter with preparations of spore cultures in the form of dried and heated muscle pulp from an infected calf, and with natural and artificial aggressins, has given place in recent years to immunisation with formalin-treated cultures. This method, first introduced by Leclainche and Vallee (1925), and advocated by M'Ewen (1926), Karman (1927) and others, has become the standard method of immunisation against the disease in many parts of the world. The immunity established is both antibacterial and antitoxic and is far superior to that established by means of natural or artificial aggressins.

To ensure massive growths for the purpose, use has been made of glucose broth containing pieces of autoclaved meat, pieces of sterile tissue or heart muscle of an inoculated guinea-pig (Cordier, 1926). These methods have the disadvantage that particles of the tissue used for creating anaerobiosis become mixed with the bacterial suspension. M'Ewen used diffusion shells containing minced liver in conical flasks of sucrose broth, and Sheather (1928) replaced the diffusion shells by porous Porcelain cells. Among methods for preparing tissue-containing media, M'Ewen's procedure and Sheather's modification of it are the best for obtaining growth free from tissue particles. Among methods dispensing with the use of tissues, the catalytic device of McIntosh and Fildes (1916) is efficient with agar slants and plates and with small volumes of liquid media, but it is less useful for bulk preparation of vaccine. The central catalysing plant advocated by Boëz (1927) for growing anaerobes in a series of containers may be more useful for this purpose. Certain chemical substances have also been used

*Reprinted from the Journal of Pathology and Bacteriology Vol. LIX, Nos. 1 and 2 pp. 37-50, 1947.

to replace animal tissues in producing anaerobiosis. Reduced iron (Scott and Brandly, 1933), sodium hydrosulphite (Aristowsky and Minkewitsch; 1934-35) and levulinic acid all have reducing action. Certain substances containing a sulphhydryl group, such as cysteine, glutathione and thioglycolic acid, are also powerful reducing agents. Ehrismann (1936) showed that ascorbic acid (vitamin C) can bring about growth of anaerobes.

But the literature dealing with chemical reducing agents in the growth of anaerobes is mainly academic. Except perhaps for sodium thioglycolate (Brewer, 1940) chemical reducing agents have not been used extensively for routine cultivation of anaerobes or bulk production of anaerobe vaccines.

Part I. Cysteine Hydrochloride Broth

Hosoya (1925, quoted by Frei and Hall, 1931) demonstrated the use of cysteine for growth of anaerobes, and Frei and Riedmüller (1930-31) and Frei and Hall have grown anaerobes in solid and liquid media containing 0.3 per cent. cysteine hydrochloride. This medium is successful because the—SH group in cysteine has reducing properties capable of yielding a high reduction potential uninfluenced by the presence of its oxidised -S-S-form. The experiments described in this section concern the use of cysteine as reducing agent in media for routine production of blackquarter vaccine.

METHODS

Relatively high concentrations of cysteine hydrochloride render broth very acid and also turbid. A 12.5 per cent. solution of cysteine hydrochloride is neutralised by an equal volume of $N.NaOH$ and the turbidity also disappears. For convenience, a solution of cysteine hydrochloride of known strength was sterilised by candle filtration and kept in a McIntosh and Fildes's jar under anaerobic conditions for addition to media as required. Such a solution retains its full reducing properties for a long period. Normal solution of sodium hydroxide are usually sterile a few days after preparation, but such solutions were usually autoclaved and sealed with paraffined plugs. To prepare the medium the cysteine solution and an equivalent quantity of $NaOH$ were added to the broth. Sometimes a mixture of equivalent proportions of cysteine hydrochloride and $NaOH$ solutions was added to media, the two solutions being autoclaved before or after mixing. Frequently, the required percentage of cysteine hydrochloride was added to broth, which was then adjusted to the required pH by addition of $NaOH$ as usual and finally sterilised by heat.

EXPERIMENTAL RESULTS

Concentration of cysteine hydrochloride for growth of Cl. chauvoei

Expt. 1. Nine c.c. amount of 1.0 per cent. glucose broth containing 0.05, 0.02, 0.01, 0.005, 0.002 and 0.001 per cent. respectively of cysteine hydrochloride were tubed. Duplicate tubes had a layer of paraffin. Two strains of *Cl. chauvoei* were used as seed, namely no. 14, an avirulent, and no. 26, a virulent strain, one drop of meat culture being seeded to each tube. Growth was read at 24 hours (table I).

Expt. 2. Cysteine hydrochloride was added to broth, with or without glucose, to final concentrations of 0.01, 0.025, 0.05 and 0.075 per

cent. The pH was adjusted to 7.0. Ten-c.c. quantities of the media were sterilised at 120° C. for half-an-hour. When cooled to room temperature, they were seeded with one drop of 18-hour meat culture. Three strains of *Cl. chauvoei* and one strain of *Cl. septicum* were used; readings were made after 24 hours (table II).

TABLE I

Minimal effective concentration of cysteine hydrochloride in glucose broth for growth of Cl. chauvoei

Strain	Final concentration of cysteine hydrochloride (per cent)* Cysteine neutralised									
	before sterilisation					after sterilisation				
	0.05	0.02	0.01	0.005	0.002	0.05	0.02	0.01	0.005	0.002
14 (P)	+	—	—	—	—	+	+	—	—	—
	+	—	—	—	—	+	+	—	—	—
26 (P)	+	+	+	+	—	+	+	+	+	—
	+	+	+	—	—	+	+	+	—	—

+ = growth; — = no growth.

In series (P) the medium was covered by liquid paraffin.

* The sterilised cysteine was added to sterile medium in the final stage.

TABLE II

Minimal effective concentration of cysteine hydrochloride in broth and glucose broth

Strain		Final concentration of cysteine hydrochloride (per cent.)			
		0.075	0.05	0.025	0.01
<i>chauvoei</i> 44		+	±	—	—
	(G)	+	+	—	—
" 45		+	+	—	—
	(G)	+	+	—	—
" 26		+	+	—	—
	(G)	+	+	±	—
<i>septicum</i>		+	+	±	—
	(G)	+	+	+	+

+ = profuse growth ± = moderate growth.

In series (G) the broth contained 1.0 per cent. glucose.

Expt. 3. To ascertain if growth was proportional to the amount of cysteine added, the growth was quantitatively estimated. Thirty-five-c.c. quantities of ordinary broth and of 0.5 per cent. glucose broth

containing different concentrations of cysteine hydrochloride were made. The pH was adjusted (in most cases) to 6.8. Tubes were sterilised at 120° C. for half-an-hour and sown with 0.5 c.c. of meat culture of *Cl. chauvoei* 44 soon after cooling. The quantity of growth after 48 hours was ascertained by weighing the centrifuged dried deposit (table III).

TABLE III

Amount of growth in relation to concentration of cysteine hydrochloride

Medium	Concentration of cysteine hydrochloride (per cent.)				
	0.2	0.1	0.05	0.025	0.0125
Broth pH 6.8	7.5	4.3	3.9 (2.4, 2.2)	5.8	1.6
0.5 per cent. glucose broth pH 6.8	14.4	18.7	17.1 (14.3, 14.1)	16.7	15.5

Figures show dry weight of bacterial substance in mg.

Figures in brackets show dry weight of bacterial substance when the pH was 7.2 and 7.8 respectively.

With the inoculum used, the least concentration of cysteine hydrochloride which could be relied upon to support growth of *Cl. chauvoei* under aerobic conditions was 0.05 per cent. With increasing concentrations of cysteine the resulting growth was greater, but with added glucose, within the ranges tried, the concentration of cysteine hydrochloride made no difference to the quantity of the final growth.

Optimum pH of cysteine hydrochloride broth

Broth containing cysteine hydrochloride at 0.05 and 0.075 per cent. was set at different levels of pH. The medium was autoclaved and used fresh. Media with a pH of over 7.2 usually showed a deposit of phosphates. If this happened, every lot of medium in that experiment

TABLE IV

*Optimum PH for growth of Cl. chauvoei in 0.075 per cent.
cysteine hydrochloride broth*

Strain	pH 6.0	6.2	6.6	7.4	7.6	8.0
44	++	++	++	+	+	tr
45	++	++	+++	+	+	tr
26	++	++	++	++	+	tr
20	+	++	+	+	tr	tr
12	++	++	++	++	+	+

Growth estimated by visual examination after 8 hours at 37° C.; tr, etc. = degrees of growth.

was filtered and autoclaved a second time before being seeded from a 24-hour meat culture of one or more strains of *Cl. chauvoei*. The degree of growth was judged either by opacity after a short incubation or by weighing the dried centrifuged deposit, usually after a longer incubation. Sample results in tables IV-VI show that the most favourable pH for *Cl. chauvoei* is about 6.8. However, it was found

TABLE V

Optimum pH of 0.05 per cent. cysteine hydrochloride broth autoclaved at 120° C. for half-an-hour

Initial pH of medium	6.2	6.6	7.2	7.4	7.7
Visual examination	+	+++	++	+	—
Nephelometer reading	5.36	15.0	3.0	1.5	1.0
Dry wt. (mg.) from 20 c.c. culture .	1.5	4.0	0.9	0.4	0.3
Final pH of medium	6.1	6.5	7.0	7.4	7.7

Readings after 12 hours at 37° C.

— = no growth; +, ++, +++ = increasing degrees of growth.

TABLE VI

Optimum pH for growth of Cl. chauvoei in 0.05 per cent. cysteine hydrochloride media

Broth	pH 6.3	6.6	6.8	7.1	7.5
	11.0	17.9	15.2	13.6	13.3
Glucose broth	pH 6.2	6.4	6.6	6.8	7.0
	45.2	45.5	42.0	60.5	65.8

Figures show dry weight in mg. of bacteria obtained after 48 hours at 37° C. from 120 c.c. of culture.

in earlier experiments that growth will take place even in extreme alkaline ranges in a sterile medium containing an excess of cysteine hydrochloride (0.3 per cent.) to which glucose is subsequently added.

Effect of different grades of heat on cysteine hydrochloride in broth. Frei and Hall stress the need to avoid changes in the composition of the cysteine through overheating. The effect of the following temperatures was tried: no heating, 100° 105° and 120° C.

A 5 per cent. solution in water of cysteine hydrochloride at pH 6.8 was sterilised by filtration and 0.4 c.c. amounts were added to each of four 39.6 c.c. quantities of broth at pH 6.8 to yield a final concentration of 0.05 per cent. The first lot was

TABLE IX

Protective value of Cl. chauvoei and Cl. septicum anacultures and toxoids from cysteine hydrochloride glucose broth

Vaccine	Days grown	Paraffin layer	Bulls (50 m.l.d.)	Guinea-pigs	
				(300 m.l.d.)*	(30 m.l.d.)
Anaculture . . .	2	Yes	0/2	2/2	0/2
Toxoid . . .	2	"	1/2	2/2	0/2
Anaculture . . .	2	No	0/2	2/2	0/2
Toxoid . . .	2	"	0/2	2/2	0/2
Anaculture . . .	14	Yes	0/2	2/2	0/2
Toxoid . . .	14	"	0/2	2/2	0/2
Anaculture . . .	14	No	0/2	2/2	0/2
Toxoid . . .	14	"	0/2	2/2	0/2
Unvaccinated . .	...	...	2/2	2/2	2/2

Numerator = no. died.

Denominator = no. tested.

* All vaccinated guinea-pigs tested with 300 m.l.d. survived for more than 28 hours whereas both unvaccinated controls tested with the same dose died in less than 14 hours.

Both anacultures and toxoids were found to be safe for the experimental animals. Potency tests in bulls showed that the anacultures and toxoids were equally efficacious, except possibly the toxoid from the two-day culture under paraffin. Fifteen of the 16 vaccinated bulls survived, while two control bulls died. In guineapigs, the results with 300 m.l.d. were uniformly bad, probably because this dose of test culture was too large. But whereas the control guineapigs died within 14 hours, all the vaccinated lived beyond 28 hours, suggesting a certain degree of protection. The test in guinea-pigs was therefore repeated, each animal receiving 2.0 c.c. of the product, which was followed in 14 days by a test dose of about 30 m.l.d. The result (table IX, last column) supports the finding for bulls and shows that the anacultures and filtrates were equally efficacious in protecting guinea-pigs against infection with certainly lethal doses of test culture. In our experience, natural aggressins and toxoids of *Cl. chauvoei* alone are less useful.

Potency of Cl. chauvoei anaculture and toxoid prepared in cysteine hydrochloride broth

It was surmised that the immunising property of the toxoids in the last experiment was due to the *Cl. septicum* toxoid, because Mason (1936) has shown that this toxoid can protect sheep against lethal doses of

Cl. chauvoei. It was considered advisable, therefore, to test whether in cysteine medium sown with *chauvoei* sufficient toxin would be formed to produce a toxoid protecting against *chauvoei*.

Cysteine hydrochloride glucose broth as used in the last experiment was put up in three conical flasks in 50-c.c. quantities. As soon as the medium had cooled to room temperature, each flask was sown with 1.0 c.c. of a 24 hour meat culture of a virulent strain of *Cl. chauvoei*. One flask was formalised (0.3 per cent.) after two days' incubation and another after 14 days. After addition of formalin, the flasks were left at 37°C. for a further 24 hours. A portion of the contents of each flask was then filtered through a Berkefeld-N candle. A third flask sown with a heavy inoculum was formalised after 12 hours' growth in order to ascertain if there was any virtue in using a young culture, as with certain other bacterial vaccines. Groups of 8-16 guinea-pigs were given 1.0 c.c. of anaculture or 3.0 c.c. of toxoid. The animals were tested for immunity after 18 days with what was ascertained to be a lethal dose of calcium chloride suspension of washed spores of *Cl. chauvoei*. There was no significant difference in the mortality rates between the control group and the groups previously treated with filtrates; but the difference between the control group and the groups treated with anaculture was highly significant (table X). Thus *chauvoei* filtrates had no detectable protective properties. On the other hand, anacultures whether from 12 hours's, 2 days' or 14 days' growth were efficient immunising agents. This is in agreement with Henderson (1932), who showed that somatic antigens play the major part in *chauvoei* immunity. It is preferable, however, to use a 48-hour rather than a 12-hour culture, since growth is much more abundant at 48 hours.

TABLE X

Protective value of Cl chauvoei anaculture and toxoid prepared from cysteine hydrochloride cultures incubated for varying times

Vaccine	Incubation for	Guinea-pigs
Anaculture . . .	12 hours	0/8
" . . .	2 days	0/16
" . . .	14 "	0/16
Toxoid . . .	2 "	4/8
" . . .	14 "	4/8
Unvaccinated . . .	...	4/8

Numerator=no. died. Denominator=no. tested.

DISCUSSION

For manufacturing blackquarter vaccine, there are obvious advantages in the use of a cysteine medium: it is clear, it can be sterilised in the final stage and it involves no handling beyond that required for bottling.

It is advantageous to use a mixed *chauvoei* and *septicum* anaculture, because it confers greater immunity than anacultures of *Cl. chauvoei* alone. It is also an advantage that the same vaccine can be used for sheep, in which *Cl. septicum* plays a predominant role.

Cysteine hydrochloride is now sold in India at Rs. 150 per lb. At first sight it may appear that cysteine vaccin is more costly than that made from Noguchi medium, but on calculation and making all allowances this is found not to be the case.

SUMMARY OF PART I

(1) The lowest concentration of cysteine hydrochloride that could be relied upon for aerobic growth of *Cl. chauvoei* in broth in conical flasks was 0.05 per cent. Growth was improved by the addition of 0.5 per cent. glucose.

(2) The optimum pH was 6.8, though growth would also take place in a slightly alkaline medium. There was no growth in a medium more acid than pH 5.6.

(3) Growth was equally good whether the medium was sterilised by filtration or by heat at 100-120° C. The usefulness of the medium was not reduced by heat sterilisation within a pH range from 3 to 9, provided it was finally adjusted to about pH 6.8.

(4) Cysteine hydrochloride broth must be used fresh, but if glucose is also present the medium is suitable for growth within at least the first 24 hours after preparation. Also, cysteine broth containing glucose could be regenerated within at least five days of its preparation by heating for half-an-hour at 120° C. just before use.

(5) Anacultures of *Cl. chauvoei* prepared from cysteine hydrochloride glucose broth are equally potent whether collected from 12-hour, 2-day or 14-day cultures. It is preferable, however, to use cultures two days old. *Chauvoei* toxoid alone has no appreciable protective properties, but if mixed with *septicum* toxoid it confers a high degree of immunity.

(6) The following procedure for preparing blackquarter vaccine from cysteine hydrochloride broth is recommended. Broth containing 0.5 per cent. glucose and 0.05 per cent. cysteine hydrochloride is adjusted to pH 6.8, filled into conical flasks to near the neck, heated at 120° C. for half-an-hour and sown soon after cooling with a 1 per cent. inoculum of *Cl. chauvoei*

from an 18-hour meat culture. After 48 hours' incubation, an anaculture is prepared by the addition of formalin to a concentration of 0.5 per cent. and leaving the culture a further 24 hours at 37° C. It is preferable to add an equal volume of *septicum* anaculture prepared in the same manner.

Part II. Acid Digest of Liver and Meat

Less fastidious anaerobes such as *Cl. septicum* and *Cl. tetani* have been grown in relatively simple media such as glucose broth under a paraffin layer. It is well known that *Cl. chauvoei* will not grow in any such media.

It has been a general experience that by substituting liver extract for ordinary broth or pieces of liver for minced heart in Robertson's meat medium a more profuse growth of anaerobes is usually obtained. It was thought that this was perhaps due to the higher liver content of glycogen and perhaps of sulphur-containing proteins which may yield active -SH groups. But since a simple liver extract did not support growth of *Cl. chauvoei*, experiments were undertaken with liver digests. It was anticipated that some of the amino-acids released from the proteins by hydrolysis would contain sulphydryl groups, which are known to be powerful reducing agents. Ox liver suspended in twice its weight of water was therefore subjected to digestion with a commercial pepsin at 56° C. for 5 hours at pH 2.0 and to tryptic digestion according to Hartley (1922). The media were finally set at pH 6.8, and it was found that *Cl. chauvoei* had grown in the peptic but not in the tryptic digest. At the same time, it was noticed that the liver particles in the peptic-digest flask were little disintegrated and it was found that the pepsin in use had become entirely inert; hence it was concluded that a simple acid digest of liver would be a good medium for growing *Cl. chauvoei*.

METHOD OF PREPARING THE ACID-DIGEST MEDIUM

One kg. of minced tissue, 2 litres of water and 80 c.c. of 10 N. hydrochloric acid were left to digest at the required temperature (56° or 100°C.) for the desired period. The vessel was then placed at room temperature overnight and next morning adjusted to pH 6.0 by the gradual addition of 10 N. alkali. This usually required about the same volume of alkali as of acid used for digestion. The pH was carefully checked during the addition of the last fifth of the alkali so that the pH should not go beyond 6.0. The medium was then steamed for 10 minutes and filtered through paper. The clean filtrate was adjusted to pH 6.6-6.8, distributed into conical flasks or large test-tubes (22 mm. diameter) as desired and steam-sterilised for an hour. The supernatant of an overnight meat culture serially diluted in saline was used for seeding.

Sometimes digestion was carried out with concentrated HCl. The minced tissue and concentrated acid (10 N.) were then well mixed, the water being added at the end of the stipulated period of digestion. The alkali required for neutralisation could be introduced with this water,

Experience showed that if the medium was not to be ruined certain precautions were necessary. Neutralisation of the acid must not be done while the digest is hot and the alkali should be added gradually, with shaking to ensure even mixing, either after or along with water. The pH should not be allowed to rise beyond 6.8.

Replacement of liver, by muscle in the medium

As meat (muscle) may be more easily procured than liver, it was desired to ascertain how much of the liver could be replaced by meat without reducing the growth of *chauvoei*. A mince of liver and veal was put up in different proportions, Water and 10N.HCl were added as usual and after the suspensions had been left at laboratory temperature overnight as a matter of convenience, they were digested in the steamer at 93° C. for 5 hours. Media were prepared as described above from these digests and 35 c.c. amounts were put into large test-tubes, steamed and seeded with graded inocula (table XI).

TABLE XI

Replacement of liver by meat (muscle) in acid-digest medium

Seed (c.c.)	All liver	Proportion of liver to meat			All meat
		3:1	2:2	1:3	
1.0	16 ++++	16 ++++	16 ++++	16 ++++	16 +
0.1	20 ++++	20 ++++	20 ++++	16 ++	—
0.01	36 +±	36 +±	24 +++	24 +	—
0.001	—	—	36 +±	24 ±	—

— = no growth; ±, +, ++ etc. = increasing amount of growth.

Figures represent the time in hours at which growth was first seen.

Growth started first in the all-meat lot seeded with the largest inoculum; on inspection at 16 hours it was already bubbling gas while the others showed only turbidity. But this rapid growth came to an abrupt end and the final yield was the poorest of all the corresponding lots. At the other end, the lag period was relatively longer in media made from higher proportions of liver; and with the smallest inoculum no growth took place in them. The best medium was the one made from equal parts of liver and muscle.

Influence of concentration of acid, temperature and duration of digestion on the richness of the resulting medium

Digestion of mixtures of equal parts of liver and muscle mince was carried out at 56° or 93° C. in the presence of diluted or concentrated HCl for periods of 5 hours

or 5 days. The media were constituted on the following day or after standing at room temperature for 5 days. Apart from these variations, the routine method was followed. The media were put up in 35 c.c. quantities in large test-tubes. They were used soon after constitution or after an interval of 5 days; in the latter case the media were regenerated by steaming for half-an-hour just before use. Three serial tenfold dilutions of meat culture were used for seed. The cultures were inspected at convenient intervals to note when growth started. The final growth was estimated by the nephelometer (table XII).

The best medium was obtained by digestion of the tissues in the presence of undiluted HCl at 93° C. for 5 hours on a single day. It did not matter if the medium was constituted soon after digestion or after staying at room temperature for 5 days. This medium was capable of regeneration on the 5th day, but it could also be regenerated up to 15 days according to experiments not detailed here. In general, however, it is much better to use the medium as soon as it is constituted. Two other media also proved good: the 5-day concentrated acid digest at 56° C. and the 5-day diluted acid digest at 93° C.

Potency of vaccine made from liver-muscle acid digest

An anaculture was prepared from a two-day growth of *Cl. chauvoei* in acid-digest medium. The medium was prepared from equal parts of liver and meat digested in the presence of concentrated acid at 93° C. for 5 hours. Five bulls and five guinea-pigs were vaccinated, each with 5 c.c. and 1 c.c. respectively of the vaccine. Five weeks later they were tested, together with five controls of each species, with 50 lethal doses of calcium chloride suspension of *chauvoei* spores. All the vaccinated bulls and guinea-pigs survived, but of the controls four bulls and all five guinea-pigs died. The vaccine was potent.

DISCUSSION

It was thought that the value of the liver digest in supporting the growth of anaerobes possibly depended on the presence of reducing sugars or protein disintegration products containing active -SH groups. But the nitroprusside test failed to reveal the presence of active -SH groups and reducing sugars could not be demonstrated by the Benedict test. Ascorbic acid, which can induce anaerobiosis, was not detected by dichlorophenol-indophenol. But on addition of cysteine to the medium a substance capable of reducing dichlorophenol-indophenol was formed, cysteine alone being incapable of reducing dye. This might suggest the formation of ascorbic acid from dehydroascorbic acid by cysteine. Whatever the reducing substance it is inactivated by heat in the alkaline range, and ascorbic acid is also inactivated by heat in the alkaline range, and ascorbic acid is also inactivated under the same conditions. Further work is necessary before a valid explanation can be advanced how acid digests of liver support growth of anaerobes.

TABLE XII—Value of acid-digest medium in relation to concentration of acid, temperature and duration of digestion

Acid	Temperature	Period (h=hours; d=days)	Constituted (days after digestion)	Used (days after constitution)	Growth with different quantities			
					0.01 c.c.	0.001 c.c.	0.0001 c.c.	
Dilute	56° C.	5h	1	0	12	+	12	+
			{	5	—	—	—	±
		5d *	5	0	12	+	12	+
			{	5	24	+	18	+
	93° C.	5h	1	0	12	+	24	+
			{	5	24	+	24	+
		5d *	5	0	12	+	18	+
			{	5	24	+	42	+
Concen- trated	56° C.	5h	1	0	12	+	12	+
			{	5	—	—	—	±
		5d *	5	0	12	+	12	+
			{	5	18	+	20	+
	93° C.	5h	1	0	12	+	24	+
			{	5	46	+	90	+
		5d *	5	0	12	+	24	+
			{	5	24	+	42	+

— = no growth; ±, +, ++ etc., = increasing degrees of final growth. Thd figures represent time (hrs.) at which growth was first seen.
 * The mixture was at the temperature stated for 5 hours daily for 5 days.

SUMMARY OF PART II

Cl. chauvoei was grown under aerobic conditions in a medium prepared from hydrochloric acid digest of ox liver. Growth was improved and the lag period reduced when half the liver mince exposed to digestion was replaced by muscle tissue. Five hours' digestion at 93° C. in the presence of concentrated acid was satisfactory; several days' digestion was required at 93° C. in the presence of diluted acid or at 56° C. in the presence of concentrated acid. After digestion, the pH on addition of sodium hydrate must not exceed 6.8.

The medium remained usable for about fifteen days provided it was regenerated by heat before use.

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LIVESTOCK IMPROVEMENT AND CONTROL OF EPIDEMICS IN TANJORE DT.

BY

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"Good indigenous breeds suited to the climate, already exist in the areas naturally suitable for stock raising and there is no doubt that with carefully controlled breeding, systemic castration of inferior animals, organised disease control and proper feeding of stock, young and old, male and female—combined with improved marketing of livestock and animal products of all kinds, the huge numbers of livestock in India should be far more profitable to the country than they now are" thus observed Mr. A. Olver, Animal Husbandry Expert, The Indian Council of Agricultural Research in his foreward to the book "Livestock in Southern India" by Capt. R. W. Littlewood.

The idea of writing this article is to show how very aptly Mr. Olver has described in this little para the existing state of affairs about livestock and livestock position in Tanjore District. I am sure a worker in another district may find most of the ideas contained therein aptly coinciding with the state of affairs pertaining to the district in which he is working.

The polled cattle of Tanjore District with the nomenclature "Umblachery bred" is only a derivative of Kangayam breed imported into this district probably many decades ago. The progeny of those imported have adjusted to the condition of the soil and climate here and have evolved into what is now known as the Umblachery breed. Mr. R. W. Littlewood in his book Livestock in Southern India observed "except the appearance of the head, these animals present all the chief characteristics of the "Kangayam breed". Efforts have however been made to establish these animals as a separate breed by itself with the idea of declaring this a breed tract, and I am sure recognition given would go a long way in stimulating the breeders of this district to put forth greater energy.

Tanjore District is a delta area with intensive paddy cultivation. Cows are maintained in numbers more for the sake of their manure than for improving the livestock position of the villages. These animals are allowed to graze in the paddy fields after the harvest is over. The practice of collecting big herds of cows in paddy fields with the idea of enriching the field with their dung and urine is widely prevalent in this district. Those that collect the herd are men having a few cows themselves with a breeding bull or two. These bulls attract the cow

owners in villages far and near, who consent to send their cows to the herd. The man that collects such big herds undertakes to house the herd in the fields of those that pay him stipulated quantity of paddy in return for the manure value. The herd is shifted from field to field so as to be of benefit to a number of land owners. These herds are collected during the months of February or March and remain in herds till about July when cultivation commences. These herd collectors then resort to the forest grazing area in North Arcot District with their own nucleus herd after retuning the cows belonging to local owners and return after the harvest to collect the same again.

This practice clearly brings forward very many aspects of agriculture and livestock, leaving alone business proposition.

1. *Agricultural aspect* :—The need to manure the fields is great in the delta area in as much as continued exploitation of the fertility of the land is going on year after year. The amount of oil cake and ammonium sulphate available is probably too low or that the ryots are not able to pay for the purchase of the same. In the absence of provision for composting the manure as can be easily done in a mixed farm, the only possible way is to house the animals themselves in the fields during the dry months.

2. *Livestock Improvement aspect* :—The very fact that a man with a small herd with one or two bulls in their midst is able to attract a number of cow owners to send their cows to his herd clearly shows the need for good bulls in the rural area. When an owner sends his cow to this herd he expects to get back his cow in early pregnancy and in most cases that happens. Since these herds are collected during the summer months, great difficulty is experienced by these animals in obtaining enough grazing and wholesome drinking water in certain area. If those that collect the herds have no breeding bulls I am afraid they may not be able to collect a herd at all. In addition, the animals thus collected have no protection from sun and rain during the whole period of three or four months and they are allowed to remain in the open. Concentrates are not brought anywhere near the herd and there is no need to discuss about the same.

3. *Cattle Disease position* :—Invariably the Veterinary Surgeons of this district can expect to have the first set of Rinderpest reports after the return of these animals from the hills in North Arcot District in February and March. When epidemics like Rinderpest start in the herd the caretaker gets alarmed, for he is answerable to very many cow owners of the locality. Lest he should be found fault with, he disbands the herd and returns the animals to the various cow owners. Immediately we find the disease spreading in all the villages that have received back animals from

will reduce the work of the ox and consequently the number required for work. This means that only a few are to be maintained and when few, they can be maintained well. Hence farming is to be mechanised where ever possible.

Cattle or sheep are not maintained solely for work. They are required to give us meat, and milk, which being biological products, are superior in quality vegetable products. But first of all the question, is of the quantity, and when that is satisfied the quality is to be considered. And, therefore, although the agriculture may be mechanised, the cow and the sheep can never be written off the list.

I have not endeavoured to go into the details of each item suggested above, as that is beyond the scope of this small article,

SUMMARY

Cattle can be fed better

- (1) By reducing the surplus stock,
- (2) By cultivating grass in wastelands,
- (3) By growing grasses in Reserve Panchayat Forests,
- (4) By Cultivation of fallow lands with short term fodder crops,
- (5) By inter cultivation,
- (6) By treating the farm bye-products chemically and making them assimilable for animals,
- (7) Preserving excess quantity,
- (8) Mechanization of Farming Industry.

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IMPROVING THE MILK SUPPLY OF TOWNS*

By

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In dealing with the problem of milk supply in India, the vital distinction between increasing the milk supply of a town or a particular urban area and of a province or the country as a whole is to be recognised. The former, unlike the latter, can be achieved in comparatively short time by adopting measures such as are proposed to be discussed at some length in this note. These measures aim at making the milk produced in areas surrounding the town available to it instead of the milk being converted into products, as at present.

The improvement in the existing milk supply of a town can broadly speaking be brought by (i) augmenting the existing milk supply by developing new sources, to enable the supply to cope with the demand, and (ii) reorganising the existing system of control and supervision of the milk supply to the town.

The present high level of prices of milk and milk products in town is mainly due to the fact that supply is not able to cope with the demand. The first step to be taken, therefore, is to find out ways and means of augmenting the existing supply. What these should be would depend on the location of the town and its surroundings. The present system of producing milk by housing cattle in the heart of the town has been universal in the country and has been found to be most uneconomical and unhygienic, besides leading to the gradual destruction of the valuable cattle wealth of the country. Any new method adopted should, therefore, aim at abolishing these stables and for that reason the source for the increased supply of milk would have to be looked for from areas outside the towns. This source may be (i) organisation of milk supply from areas surrounding the town, (ii) establishment of creameries in milk-producing areas, and (iii) establishment of dairy farms.

Organisation of milk supply from areas surrounding the town will divide itself under two heads: (a) Milk supply from villages lying adjacent to the towns or what may be called 'inner belt'—extending up to a radius of about 15 miles of the town, and (b) milk supply from villages lying beyond the radius and extending up to 50 miles, which may be called the 'outer belt'. Of the two, it is desirable that the organisation of the milk supply from the 'outer belt' should be taken up first because that will help in actually augmenting the milk supply without disturbing the present supply as the milk is already being brought by various means to the town from the inner belt'.

The Inner Belt

Many of the towns in India where shortage of milk is felt at present are fortunately surrounded by areas which form potential sources of supply of milk. Almost every town, whether small or large, derives nearly 50% of its milk requirements through what are called 'milk carriers'. The milk collected by them from the villages is carried on cycles or head loads and distributed direct to individual customers. Their range of work extends even up to 12 miles radius from the town. For some of the larger towns like Bombay, Madras, Calcutta, etc., which are well provided with local trains, milk is brought even from greater distances by these carriers. This is one of the most important agencies in the milk supply to towns and one which presents great possibilities of improvement. The sources of supply of milk in this system also lend themselves for further increased production. Some of the measures which can be adopted for this purpose are :

- (i) To organise the producers on co-operative lines and arrange for them to deal direct with the consumers themselves, to the mutual advantage of both, by doing away with the middlemen or the carriers.
- (ii) To organise the carriers themselves on co-operative lines by giving them facilities of a central milk collecting depot or depots from which milk can be economically distributed collectively, instead of each individual carrier going round the delivery. This will ensure a greater uniformity of method and fewer distributing agencies, consequently less supervision and control by the authorities concerned.
- (iii) To open depots for cattle feeds in the producing areas and subsidizing the supply, if necessary.
- (iv) To provide milk supply cans of suitable types and at a concession rate, as also cycle tyres, tubes, etc., which are very difficult to obtain at present.
- (v) In the case of carriers bringing milk by local trains, allowing them concession in the freight and providing a special carriage or compartment where milk can be put in a clean place during transit.
- (vi) For the municipalities to provide special depots well-distributed in the town, from where milk can be distributed to the areas apportioned to each set of carriers.
- (vii) To give loans to the organised small producers for purchasing cattle and feeding stuffs to effectively increase the production of milk in the zone surrounding the towns. It has been found from experience that by proper feeding and maintenance the milk yield of a village cow can be increased even up to 50 per cent.

The Outer Belt

The organisation to be set up for the purpose should aim at organising the producers, the collection of the milk from them and its rapid transport to a suitable centre where it can be processed and distributed through a reliable agency or agencies, so that the quantity of the milk is assured and it is sold at a reasonable price to the consumers. Such an organised effort calls for the following:

(i) *Survey* :—A rapid survey of the areas is necessary in order to ascertain firstly the quantity of milk available for collection after allowing for the domestic need of the producers and the wide fluctuations for the different seasons which invariably occur under village conditions, and secondly the disposal of surplus milk and the scope for developing this source. Such a survey can be satisfactorily carried out in two or three months by employing adequate temporary staff, but this will require expert guidance.

(ii) *Organizing the producers* :—This will have to be undertaken preferably on co-operative lines, based on the data obtained in the survey of the area, so that those villages or centres which produce sufficient quantities of milk which can be handled economically, need only be considered in the earlier stages. It will be desirable to attempt to centralise the milking in the villages right from the beginning and in order to provide an inducement for the purpose to the villagers, each village should be provided with facilities of water supply, etc. the cost involved being partly or wholly borne by the Government.

(iii) *Collection of milk* :—This should be done at centres which are so situated that the collection of milk may be done as expeditiously and economically as possible.

(iv) *Rapid transport of milk* :—Quick haulage of milk to its destination soon after production is very essential as the time factor is most important with such a highly perishable food as milk. The haulage can be done either by rail or road, but in a majority of cases it will have to be done by the latter, in which case motor transport will have to be employed. Motor lorries for this purpose will be required.

(v) *Processing of milk* :—As milk will be collected from various sources and produced under insanitary conditions and as some time must elapse before it is made available to the consumers it will have to be processed (heated or chilled or both, i.e. pasteurised) and for this a processing centre or pasteurising station will have to be established, preferably in the consuming town itself, with facilities of cold storage etc. so that the distribution of milk can be regulated according to the requirements of the consumers irrespective of the time of milking in the villages.

(vi) *Distribution depots* :—The milk collected and processed above as can then be distributed to the consumers over the counter through depots specially provided for the purpose, where milk of guaranteed quality can be made available to the public. It is not considered feasible in earlier stages to attempt house to house delivery of milk, particularly in view of the shortage of containers and bottles.

(vii) *Supply of cattle feeds* :—As a necessary adjunct to such a system of milk collection and supply, arrangements will have to be made to supply cattle feed such as oilcakes, bran, chunni, etc., to the village milk producers so as to give them an incentive for producing more and better quality of milk. In some cases this idea of helping the villager can be further developed by arranging for the supply of his daily requirements such as kerosene oil, sugar, cloth, etc. against delivery of milk.

Co-operative Working

The scheme as outlined above by virtue of its special features of collective working may preferably be run on co-operative lines under the aegis of Co-operative Department of the province.

Containers governing the selection of a town for the scheme and the pre-requisites to the successful adoption of a scheme of this nature will be as follows :

(a) That the town selected for the supply of milk is surrounded by milk producing villages or centres lying within 15 miles of it and the quantity of milk produced by such centres should be sufficient to make its collection, haulage, handling and distribution economic on a consideration of working costs. In the light of the experience gained so far it may be stated that each village or centre should be on an average be able to supply a minimum quantity of $2\frac{1}{2}$ maunds of milk a day.

(b) That the majority of villages to be tapped should lie as far as possible along side the roads to be traversed or at a distance not exceeding $3\frac{1}{2}$ to 3 miles from the road, as it is necessary to collect the milk rapidly for transporting it to its destination.

(c) That the area is well provided with roads which will permit of the haulage of milk by motor transport in all seasons of the year.

(d) That the producers must be assured of the market for their milk throughout the year at a predetermined price and the milk must be paid for periodically, as ready cash is the greatest need of every stockowner.

Establishment of Creameries

A scheme for establishment of creameries in milk-producing areas in the provinces may or may not be found feasible for all towns or urban areas. The location of some of the towns, which are generally of a large size like Bombay, Calcutta, Madras, etc. would permit of the additional collection of milk being

drawn only from sources placed far away from them and which would involve long-distance transport of milk by rail, after processing it at the collecting end itself. Such sources of supply generally are to be found in every province and which at present are not fully exploited for the supply of milk in liquid form. The organisation to be set up for obtaining milk from these areas would consist of the following.

(i) Establishing a cremery or milk collecting and processing centre in the milk-producing area itself.

(ii) The transport of milk so processed by rail and in refrigerating vans over distances ranging from 50 to 300 miles.

(iii) Establishing a milk distributing organisation in the city itself with sufficient cold storage facilities.

The extra overhead charges involved in a system of milk supply of this kind will be more than compensated for at by the low price at which the milk can be purchased in these milk-producing tracts. To make the working of such a creamery economically possible it should be in a position to receive and process at least about 6,000 to 8,000 lb. of milk a day, but this quantity would vary from place to place according to circumstances. The whole of this organization can be run either by a Government agency or through private enterprise which may be subsidised. It will, however, be possible to build village milk producing societies round about such cremeries and in course of time they may be run on co-operative lines.

Establishment of Dairy Farms

Experience has shown that milk obtained from villages fluctuates widely in quantity according to seasons and that it is at its lowest in summer. Since the supply of milk to the consumers must be constant and assured throughout the year, in order to counteract the above drawbacks there should be another and more dependable source of supply of milk for the town. This should be in the form of a dairy farm or farms established as near to the town as possible either by Government or through private enterprise. In the latter case a subsidy may be provided in some form or another preferably by the payment of a certain amount per pound or maund of milk of a guaranteed quality delivered to the town. Such farm or farms should be producing at least 25 per cent of the quantity of milk obtained under the village system to meet the deficit during the scarcity period. The following facilities may be needed to establish and encourage such a supply.

(i) Facilities of Land grazing.

(ii) Provision of irrigation water for the cultivation of fodder crops at a concession rate.

(iii) Concession in railway freight with the facility of refrigerating vans.

- (iv) Provision of necessary equipment for the dairy, etc. under priority.
- (v) Providing subsidy to enable the farm-produced milk to be sold in the consuming areas at controlled rates.

Control and Supervision

Reorganisation of the existing system of control and supervision of the milk supply to the town is of supreme importance. No matter how carefully the agencies for the increased milk supply at a place are arranged they will not stand a fair chance of surviving unless these are effectively protected against unfair competition from the trade, both in respect of price as well as quality. This calls for proper control and supervision over the supply. One of the greatest handicaps in the proper supervision and control of the milk supply of a town is the existence of the innumerable agencies or channels through which milk is made to pass during its handling and distribution in a town. This also hinders the development of the dairy trade on right lines. The reorganisation of the present system of milk supply calls for definite measures to be taken. They may be summed up as follows.

(a) *Creation of a milk supply organisation*:—Adoption of measures which would ensure adequate milk supply on the lines indicated above should provide such an organisation for obtaining milk from reliable sources. Such an organised effort will enable the milk-supplying agencies to be reduced to a few selected ones and this will call for the division of the milk-producing areas into zones, so that a zone may be assigned to a particular agency to prevent the various selected agencies from competing with one another unfairly.

(b) *Creation of milk procurement and distribution organisation*:—This is necessary for replacing the innumerable individuals employed in distributing milk, by a few selected agencies. As in the case of (a) above, the area of trading in the town will also have to be zoned out, so that each agency is allotted a zone to prevent unfair competition.

(c) *Removal of cattle stables from urban areas*:—As more and more milk is imported in the town from the rural areas through an organised effort, the city milch cattle stable will have to be removed. Their removal will call for (i) the prevention of the return to the city of cattle salvaged from the stables when they come into calf again and (ii) the absorption or colonization of the replaced animals from the city at centres away from the town from where milk could be easily obtained for the town.

(d) *Adoption of an effective system of licencing and supervision*:—The introduction of a complete and effective system of licencing of the trade with suitable standards for quality and an adequate and efficient staff for enforcing supervision and the standards of quality will be a necessary adjunct to such a reorganisation.

(e) *Appointment of a milk control board* :—Such a board may be for the province or the state as whole or for the town in the first instance, where the improved milk supply scheme is to be worked. Experience in the past has shown that efforts made at reorganising the milk supply of a town were always too much diffused and there was no co-operation between the man in the trade and the controlling authorities in improving matters. It is, therefore, felt that there should be a central independent body which should coordinate the activities coming under the reorganisation of milk supply of a town. It is suggested that a milk control board should be created. Such a board should be constituted of a limited number of members, not exceeding seven, representing government, municipality, producers, traders and consumers. Its primary functions should be the following:

- (i) To safeguard the interests of the producers, traders and consumers.
- (ii) To periodically fix the purchase as well as sale prices of milk for that area.
- (iii) To control the marketing and distribution of milk according to the needs of the different classes of consumers
- (iv) To control the production of milk and milk products in a consuming area as well as in areas adjoining it.
- (v) To fix standards of quality of milk and milk products sold in that area.
- (vi) To act in an advisory capacity in matters relating to the policy to be followed and measures to be adopted for the development of the milk trade.

Technical Guidance

Whatever be the type of scheme adopted by the provinces or states for improving the milk supply of a town, technical help and guidance will be needed to solve the difficulties which are bound to arise at every stage with the commencement of the scheme. The prerequisite for the success of such a venture will be the provision of adequate technical staff. No doubt expert help and guidance will always be made available from the Centre but the Provincial Governments shall have to maintain staff of their own to be on the spot. The strength of the staff required will depend on the amount of dairy development work undertaken by the province concerned. Since this kind of work will require qualifications and experience of a high order, the pay and status of the posts to be created should be such as to attract men of the right type who could command the confidence of the trade.

Urgent Steps

This note has been drawn up with the idea that it will suggest to the Provinces and the States the various ways and means which are possible to adopt for improving the milk supply of a town. The steps which should be taken to achieve this one are briefly indicated below.

(a) Appointment of technical staff.

(b) Starting of surveys of (i) the potential milk-supplying areas to determine to what extent each area can be depended upon to supply the needs of the towns and for organising the supply from that area whether on co-operative lines or by the establishment of creameries or milk processing centres, (ii) sites suitable for establishing large-scale dairy farms so that the milk supply from the rural areas can be supplemented by milk obtained from reliable sources, and (iii) urban areas or towns where the reorganisation of the milk supply is proposed to be introduced. In the latter connection it must be remembered firstly that instead of large cities where the problems are too numerous and complicated it may be desirable to select a few small towns to begin with where a more complete model scheme on an experimental basis may be tried out. Secondly the town or area where the shortage is most acute should be tackled first, both for production and distribution and thirdly, the total requirements of a town or area may not be met all at once but it may be feasible to mitigate conditions on a progressive and limited scale to begin with.

(c) Establishment of a milk control board and the creation of an organisation for the production of milk and another for the procurement and distribution of milk based on the surveys carried out.

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No. 6

Editorial

THE VETERINARIAN'S ROLE

What is the role of the Veterinarian in the scheme of things to be and in the reconstruction plans now being formulated all over the country—is a question that is being forwarded to us by many a Veterinary Practitioner in the various parts of the country who describe to us in a very pathetic and painful manner the conditions obtaining in their places. They write that it is all very well to say that the Veterinarian is the one man who can ensure the supply of clean and wholesome food to the nation and who can enable the country to become self-sufficient in the matter of our food supply, but who is there to realise his potentialities and give him all the reasonable facilities and opportunities for development? It also appears that the Veterinarian is being slowly elbowed out of his legitimate spheres of work and relegated to the back ground by non-Veterinary men. This cry of denial of opportunities and facilities to the Veterinarian is becoming more and more insistent that we feel it highly necessary to draw the attention of the Government and others responsible to the administration of the country and earnestly request them to rectify matters before they become too serious. From the Prime Minister down to the peasant, everyone is praising the importance of livestock to the land. Mahatma Gandhiji, as long as he was alive, spared no effort to stress the economy of the cow, and repeatedly said that we cannot restore our prosperity unless we rehabilitate the cow to its pristine glory and position. But all these become mere words when it is sought to be translated into practice. It is not realised sufficiently that the Veterinarian cannot possibly make good his claim of the Guarantee of the Nation's food supply unless he is given the opportunities. He must have the wherewithal to proceed: he must be

given the necessary part to play. As it is, as one of our colleagues very pathetically wrote, the Government are able to find Crores and Crores of Rupees to instal machinery for producing Artificial Fertilisers, but they hardly spend a few lakhs to improve the existing natural Master-Fertiliser in the cow. This picture is not overdrawn. We were told of the country being studded with Farms in the the course of a few years, of Veterinary Research Institutes here and there, of breeding stations in the various breeding districts etc., etc. All these are very good and encouraging indeed. But who should be entrusted with these things? Who else, but a Veterinarian? Unfortunately, it is found that he is not given the role he is entitled to get by virtue of his qualification, training and equipment. Non-Veterinary men who know very little about animals are being selected for livestock breeding stations and for animal nutrition work. And even in the Veterinary Research Institute at Mukteswar and Izatnagar—the premier Veterinary Institutes in India—we are given to understand that the Veterinarians are being slowly ousted and non-veterinary men are being pushed in. This is indeed very sad. Is this conducive to healthy development of Animal Husbandry? Is not a knowledge of Veterinary Science essential for animal breeding and nutrition work? This question of who should be in charge of livestock operations has long been a point of acrimonious discussion, as long as there was no organised Veterinary Service. But now when Veterinary Science has sufficiently well advanced, and when highly qualified Veterinary graduates are available, it is indeed idle and unprofitable to start the discussion all over once again. Sir Frank Ware, till recently the Animal Husbandry Commissioner with the Government of India, drove the nail in hard when he gave his opinion in the following words: "In the subject of livestock production and animal health, they (Veterinarians) required the help of Geneticists, Bio-chemists, Pure-scientists who devoted their time to subjects like Helminthology, Entomology, etc. To get a 'punch' into this question of livestock improvement, they must have that 'centrally directed drive' and he could not see anybody who was going to be able to give that drive except a Veterinary Graduate." And, therefore, to rake up this question once again at this time, is a fruitless task which will profit no one.

It can only lead to diversion of useful energy into a barren tract. We appeal to the Governments, both Central and Provincial, with all the earnestness at our command, to give the Veterinarian a fair deal and give him the necessary facilities and opportunities to play his part in full to the people and to the country.

We would like to take this opportunity of repeating our appeal to the profession once again and request it earnestly to organise and form at a very early date an **Indian Veterinary Council** to look after its interests. Encroachments into its fields and denial of legitimate opportunities for its advancement have become possible owing to the absence of a custodian of its rights and privileges, not less its duties and responsibilities, and it is high time the profession set about it in right earnest soon.

VETERINARY OR ANIMAL HUSBANDRY

[We gladly give prominence to the following letter from Rao Bahadur R. Swaminathan, B.A., C.M.V.C., Madras. *Ed. I.V.J.*]

The Government Department which concerns itself with the livestock of the country is designated differently in different provinces. In some, it is simply Veterinary Department: in some others it is Veterinary and Animal Husbandry Department: while in a few others it goes by the name of Animal Husbandry Department. All these mixed and varied designations, are, I am afraid, the result of the lack of correct understanding of what really Veterinary Service means. And, therefore, the following definition of Veterinary Science as given in Encyclopaedia Britannica 14th Edition will, I am sure, be found interesting:

“ Veterinary Science is the branch of knowledge that deals with the anatomy of the domesticated animals, their physiology and racial characteristics, their breeding, feeding and hygienic management, the pathology and treatment of their diseases and injuries, their relation to man with regard to inter-communicable maladies and to his use of their flesh and products.”

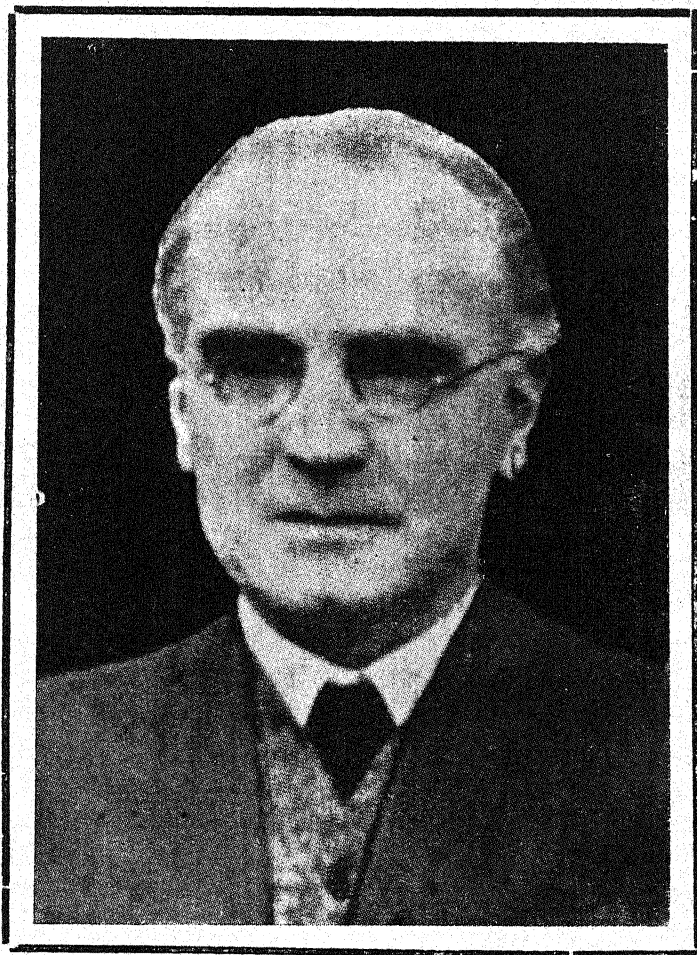
This elaborate definition from an authoritative international publication should be sufficient for us to decide that the correct description should be ‘Veterinary Department’ and nothing else. It would be a good thing if this designation is adopted uniformly all over the country.

THE LATE PROFESSOR DONALD CAPELL MATHESON

We deeply regret to record the passing away of Prof. Matheson of the Royal (Dick) Veterinary College, Edinburgh, on 8th March, 1948, at the age of 67. In his death, the profession has sustained a grievous loss, and the *Indian Veterinary Journal*, a very noble overseas Patron.

As our readers are aware, Prof. Matheson was a regular contributor to this *Journal* ever since its inception. His articles have always been characterised by a directness and simplicity which revealed a great intellect and deep understanding. His life, like those of many great men, appears to have been one continuous toil and labour and, from the Memoir which has appeared in the *Veterinary Record*, we see the Professor had to carry 'a very heavy burden' ever since he took over the chair of Pathology and Bacteriology in 1913. To quote from the Memoir, "It was typical of the man that he was never known to intrude his difficulties and troubles on others, nor did he ever say a harsh word against any man. Professor Matheson had a simplicity of character which puzzled many, but from behind a facade of deep seriousness, there would every now and then flash out a whimsical and arresting utterance which revealed the hidden depths of the man". Many students from India who had opportunities of studying and working under Professor Matheson have nothing but praise for the Professor's abiding interest in their welfare and study.

We extend our heart-felt and deep sympathy to Mrs. Matheson and other members of the bereaved family.



THE LATE PROFESSOR DONALD CAPELL MATHESON,
F.R.C.V.S., D.V.S.M., F.R.S.E.,

Professor of Pathology and Bacteriology,
Royal (Dick) Veterinary College, Edinburgh, (SCOTLAND).

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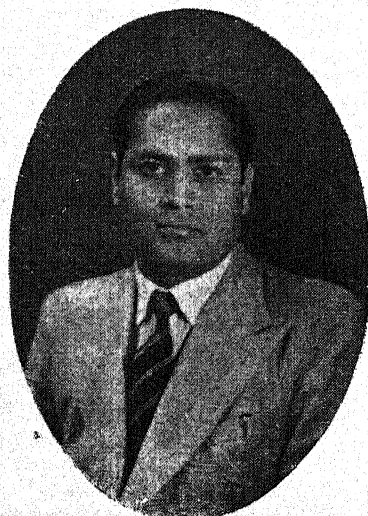
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Agrl. College, Sabour, Bihar.
(Advanced studies in Helminthology)



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Animal Husbandry Dept., U.P.
(Higher studies in Applied Genetics,
Dairy Husbandry and Farm organisation at
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Roseworthy.)



R. B. PRASAD, G.B.V.C.,
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News

THE TRANSFER OF THE REMOUNT AND VETERINARY SERVICES OF INDIAN ARMY TO THE ARMIES OF THE DOMINIONS OF INDIA AND PAKISTAN*

By

BRIGADIER E.S.W. PEATT, O.B.E., F.R.C.V.S.

The Director of Remount and Veterinary Service (D.R.V.S.) Supreme Commander's Headquarters, India, completed the hand over of his responsibilities to the Ds. R.V.S. Army Headquarters, India, and Army Headquarters, Pakistan, on 15th October, 1947. Thus ended over fifty years' administration of the Remount and Veterinary Services of the Indian Army by British Officers.

The following list gives the names of Directors of Veterinary and Remount Services in India from 1889 up to the present day :

Principal Veterinary Surgeon in India

1889—Lieutenant-Colonel W. A. Russel

Principal Veterinary Officers in India

1894—Colonel F. Duck

1897—Colonel H. Thomson

1902—Lieutenant-Colonel B. L. Glover, C. B.

1903—Colonel I. Matthews, C. B.

1906—Colonel J. A. Nunn, C.B., C.I.E., D.S.O., F.R.C.V.S., F.R.S.E.

1908—Colonel C. Rutherford, C.M.G., F.R.C.V.S.

1913—Colonel E. H. Hazelton, F.R.C.V.S.

1916—Colonel L. V. Blenkinsop, D.S.O.

Directors of Veterinary Services

1918—Brigadier-General C. E. Nuthall, C.B., C.M.G.

1919—Major-General Sir John Moore, K.C.M.G., C.O., F.R.C.V.S.

1921—Colonel on the staff H. T. Sawyer, C.B., D.S.O.

1925—Brigadier F. W. Hunt, C.B., C.M.G., C.B.E.

1928—Brigadier A. J. Williams, D.S.O., F.R.C.V.S.

1932—Brigadier H. S. Mosley, D.S.O.

1936—Brigadier H. C. Dibben, C.I.E.

1940—Brigadier J. J. M. Soutar, C.B.E.

1944—Brigadier E. S. W. Peatt, O.B.E., F.R.C.V.S.

Directors of Remounts

- 1889—Colonel J. Deane
 1898—Colonel H. Goat, C.S.I.,
 1915—Brigadier-General C. F. Templer, C.M.G., C.I.E.
 1920—Colonel T. G. Peacock, C.V.O., C.I.E.
 1922—Major-General Sir W. B. James, Kt., C.B., C.I.E., M.V.O.
 1926—Brigadier W. H. Anderson, C.B.E.
 1930—Brigadier R. S. Scott, C.I.E.
 1934—Brigadier G. Edward-Collins, C.I.E., M.C.
 1938—Brigadier T. S. Jobson
 1941—Brigadier A. H. Mackie, C.I.E.

Directors of Remounts and Veterinary Services 1946.

BRIGADIER E. S. W. PEATT, O.B.E., F.R.C.V.S.

- | | |
|-----------------------------|---|
| D. R. V. S., A. H. Q. India | D. R. V. S., A. H. Q., Pakistan. |
| 1947—Brig. Gurbachan Singh. | 1947—Brig. Malik Gulshir Khan Noon,
C.B.E. |

When the war ended in 1945, the Remount and Veterinary Services of the Indian Army were still separate services and had expanded to many times their peace-time strength. Since then approximately 14,000 officers and men have been demobilized and 150 Field Units disbanded, the Army Remount Department (A.R.D.) and the Indian Army Veterinary Corps (I.A.V.C.) amalgamated to form the Indian Remount and Veterinary Corps (I.R.V.C.), and lastly the I.R.V.C. in India and the P.R.V.C. in Pakistan. The decision to amalgamate the two Services was made by the Commander-in-chief, India, in 1946, and as a first step the Director of Veterinary Services, (D.V.S.) (Brigadier E.S.W. Peatt) was redesignated Director of Remounts and Veterinary Services (D.R.V.S.) on 1st. March 1946, and became responsible for the administration of both Services. The amalgamation was finally completed on 15th April, 1947 when the A.R.D. and I.A.V.C., were amalgamated to form the I.R.V.C.

It says much for the discipline and loyalty of both Services that this was carried out without any hitch or loss of efficiency.

The newly formed Corps had only been in existence a few weeks when the momentous decision was made to divide the country into the two Dominions of India and Pakistan, and orders were issued for the Indian Army to be split. This entailed the division of personnel, animals, stores and units of the I.R.V.C. between the two Dominion Armies. Personnel were obliged to opt for the Dominion Army in which they wished to serve. Stores, animals and units were divided on a basis of 60 per cent. to India and 40 per cent. to Pakistan. One of the most difficult problems

was the question of the Remount Depots and breeding areas as two of the three depots and both the breeding areas were in Pakistan. As it was out of the question to establish breeding areas in India, except as a long-term project, it was agreed by the two Dominion Governments that Pakistan would continue to breed and mature animals for both Armies and would retain both breeding areas and the two Remount Depots of Mona and Sarghoda for this purpose, such animals as the Indian Army required to be purchased from Pakistan. The allotment of personnel, units and establishments to the two Dominion Armies is shown in the following table:

	<i>India</i>	<i>Pakistan</i>
Officers.	43	39
Veterinary Assistant Surgeons	62	64
Viceroy's Commissioned Officers	19	25
Indian Other Ranks	661	731
Non-combatants	4	2
Totals.	789	861
Mobile Veterinary Sections	2	2
Central Veterinary Stores Depots	1*	1
Command Veterinary Laboratories	2	0
Central Veterinary Laboratories	0	1
I.R.V.C. Training centre	1	1†
Army Veterinary Schools	1	1†
Veterinary Hospitals Class 1	4	3
Veterinary Hospitals Class 11	5	4
Branch Veterinary Hospitals	8	7
Remount Depots	1	2
Breeding Areas	0	2
Stallion Summer Depot	0	1
Donkey Stallion Stud	0	1
Equitation Schools	1*	1
Remount Grass Farm	1	0

* One to be formed in India

† One to be formed in Pakistan

Notes:—

- (a) The personnel strength of the P.R.V.C. is greater than that of the I.R.V.C. because of the additional Remount commitment in Pakistan.
- (b) The large number of civilians employed for labour in Remount Depots are not included.

A new commitment to be added to the responsibilities of the D.R.V.S., in both Dominion Armies is the administration of the Military Farms Department.

A copy of the farewell letter from the D.R.V.S., Supreme Commander's Headquarters, to the respective Directors of Remount and Veterinary Services in India and Pakistan is reproduced below:

My Dear ———,

On the occasion of the transfer of my responsibilities as Director of Remount and Veterinary Services, India and Pakistan, I wish you and all ranks of the I.R.V.C., in India/Pakistan the best of good fortune in the future.

I am confident that under your command the I.R.V.C./P.R.V.C. will maintain the high standards of efficiency of the Remount and Veterinary Services of the past of which both Services were justly proud.

It is the earnest hope of all British Officers of the Remount and Veterinary Services who have served in your country that the traditions of the past will not be forgotten and that the bond of friendship forged by many years of service together will continue into the future and ensure that happy relations will always exist between the Remount and Veterinary Services of India and Pakistan.

Brigadier Gurbachan Singh,
D.R.V.S., A.H.Q.,
India and Simla.

Yours, Sincerely,
E. S. W. PEATT (*Brigadier*),
Director of Rem. and Vet. Services.

Brigadier Malik Gulshir Khan Noon,
O.B.E., D.R.V.S., A.H.Q.,
Pakistan, Rawalpindi.

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Clinical Articles

MELANOMATA IN EQUINES

By

M. MAQSOOD, L.V.P. (Honours), P. G. (MUKT.),

Civil Veterinary Hospital, Murree Hills, Punjab

Melanomata originate in tissues which are normally pigmented i.e., the skin in animals, and in which the melanoblasts or the tumour cells, probably derived from the mesenchyma, manufacture a brown iron-free pigment called *Melanin*. In some of the tumours the melanin constitutes about 7.3 per cent by weight of the fresh tumour substance. Jackson (1936) states that much confusion surrounds the problem of histogenesis and classification of melanin pigmented tumours and in spite of enough literature available on the subject, we can not reach final conclusion, until we know accurately the genesis of cells carrying melanin pigment and the metabolism of melanin in the body. Melanotic tumours occur in several species of animals i.e., horse, goat, cattle, dog, pig, fowl and cat but especially quite frequently in aged grey horses and Angora goats (Caylor and Schlotthauer, 1926; McGowan, 1928; Thomas, 1929; Jackson, 1936; Gaiger & Davies, 1938). Dorssen's (1903) work shows that about 80 per cent of grey horses develop the disease if they reach old age and the incidence is such that it may be safely predicted that every such animal that lives long enough, is fated to develop these tumours. Rarely melanomata develop in horses of other colours such as Bay, Chestnut and Roan (McFadyean, 1933; Ajello, 1937).

The special liability of grey horses to melanomatosis is connected with the steady whitening of hairs; and, as after middle life the demand for melanin pigment rapidly diminishes, owing to the increasing numbers of white hairs which no longer require melanin, the incidence of the disease increases with advancing age. The whitening of the hairs is not a process of mere bleaching but is the result of an actual cessation of the manufacture or absorption of melanin at the roots of the hairs. Thus there must arise in the animal system a considerable disturbance either in the provision or manufacture of melanin. This may be probably one of the factors of tumour formation in grey horses but the exact etiology is still obscure (Hadwen, 1932; McFadyean, 1933). Ajello (1937) favours the view that melanomata may develop in situations in which melanin is normally absent and are due to hypo-function of the chromaffine system in particular of the adrenals. Beattie and Dickson (1943) state that in man, abnormal increase of cutaneous melanin pigment is found, in chronic diseases of the ovaries, uterus and of the endocrine glands especially the adrenals.

The primary tumours may develop in connection with the skin over the body exclusively but their commonest sites are the ventral surface of the tail, anus, vulva and perineum. The property of producing metastasis varies considerably, some being very malignant, while others are benign; remaining unchanged for years and showing no tendency to recur after removal. The perineal lymph glands may become involved through metastasis by way of lymphatics and in the same way, at a later stage, the peritoneum and thereby the pleura. In advanced cases multiple tumours may develop in the spleen, liver and lungs; multiple tumours may develop in the spleen, liver and lungs; metastasis occurring probably by way of blood streams.

In India, Mangrulkar (1944) had given an account of melanotic tumours which were collected from five horses, five mules and three bullocks. In this note five cases of melanomata observed in grey horses, at Lahore and Murree Hills (Punjab), are recorded.

Case Reports

1. A light grey, I. B., aged, mare, was brought to the Punjab Veterinary College Hospital Lahore, on 21st. July, 1945, with the history that about two months previously, two marble sized hard protuberances were noticed around the left lip of vulva and these continued to increase in size. On clinical examination numerous hard rounded growths, varying in size from that of a pea to a walnut were seen on the ventral surface of the tail; larger ones being near its root, besides two walnut sized growth, around the left lip of the vulva. As narrated by the owner, the former growths were present about one and a half years previously, when the mare was purchased but these had also increased both in size and number. The skin over the tumours was intact and on sections the growths presented smooth, somewhat glistening and practically black surfaces. Microscopic examination showed that the growths had the histology of a melanoma.

2. The subject a grey, I. B. mare, age about 10 years, was examined on 28th, March, 1943 in the S. P. C. A., Hospital Lahore. Four hard rounded growths (three about walnut and one marble sized) were seen, on the ventral surface of the tail, near its root and as stated by the owner these growths were noticed about two years previously. The skin over the growths was intact. The characters of the tumours resembled those of a melanoma.

3. An aged, grey, I. B., Horse, was examined on 20th. October, 1943 in the S. P. C. A., Hospital Lahore. Multiple melanotic tumours, varying in size from that of a pea to a walnut, were observed on the ventral surface of the tail and in the perineal region. It was stated by the attendant that these protuberances were noticed about two years previously and some of these had increased in size.

4. The subject—a grey, I. B., mare, age about 16 years, was examined at the annual inspection of riding horses for soundness in Murree Hills on 30th, April, 1947. A few hard growths varying in size from a pea to a marble, were seen on the ventral surface of the tail, in about its middle. It was stated by the owner that these growths were seen about five months previously.

5. The subject a light grey, I. B., mare age about 13 years, was examined at the annual inspection of riding horses for soundness, in Murree Hills on 30th, April, 1947 and a marble sized growth was seen on the ventral surface of the tail, near its root. The owner was unable to tell about its period of duration.

Pieces of the growths removed from cases Nos. 4 & 5 were sent to Research Officer, Pathology and Bacteriology Section, I.V.R.I., Izatnagar (U. P.) for histo-pathological examination. The characters of these tumours resembled those of a melanoma. Cases Nos. 1, 2, & 3 were examined, while the author was working in the Pathology and Bacteriology Section, Punjab Veterinary College, Lahore.

SUMMARY

1. The available literature on melanomata in equines is reviewed.
2. Five cases of Melanomata in grey horses are recorded and the tumours were present on the ventral surface of the tail, vulva and in the perineal region.

ACKNOWLEDGEMENTS

Thanks are due to Ch. Mohammed Yaqub, P. V. S., the then Assistant Professor of Pathology and Bacteriology, Punjab Veterinary College, Lahore, for his valuable suggestions.

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MILK THERAPY IN A CASE OF NON-PARASITIC SKIN DISEASE

By

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Venkataratnam (1941) successfully treated a number of cases of moist eczema in calves and dogs by milk therapy. It would be of interest to know whether it is also applicable to skin diseases other than eczema. The following case shows that it is worth a trial in such cases also.

A 17-day old bull-calf was received for destruction with a report of extensive skin lesions, possibly as the result of 'tick feeding' experiments. The animal, practically denuded of hair, presented a raw skin with numerous haemorrhagic spots. Pruritis was absent. The lesion extended over wide areas particularly the chest, belly, withers, knees, shanks, shoulders, head, neck and ears. The external surface of both ears was covered by scabs, exposing a raw surface on removal. There was no constitutional symptom except debility. Indurition of the skin was absent.

Slight lukaemia with eosinophilia and anaemia changes were evident on blood smear examination. A few nematode ova were found on fecal examination, but their number was too small to incriminate helminths as the cause of the condition. Skin scrapings as well as crusts were examined for mange parasites with negative results.

Treatment was adopted as an experimental measure. Standard dressings, including 'Odylen' (Bayers) were tried without effect and the condition deteriorated daily. As a last resort 'milk therapy' was decided upon. Fresh cow's milk was boiled in a clean beaker, cooled and strained through sterile muslin to remove the albuminous coagulation; first injection of 25 c.c. was given subcutaneously behind the shoulder. It caused a transient swelling. A second injection of 30 c.c. was given 4 days later followed by a third and a fourth injection with 40 and 50 c.c. respectively at 4-days intervals. Within a week after the last injection the calf began to show definite improvement. The skin scabs fell off, hairs appeared over the surface and the animal was well on its way to recovery.

My thanks are due to Mr. K. Sreenivasan, Veterinary Officer, Indian Veterinary Research Institute, Mukteswar, for permission to treat this case.

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PENICILLIN IN BROKEN KNEE

By

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History:—A two-months old she-buffalo calf of the Government Civil Dairy, Cuttack, one day injured her left knee.

The swelling that resulted from this trauma became prominent and painful and the effected knee was held in a semi-flexed position. On examination it was seen that, along with the bruise of the part, there was a tiny opening leading into the knee joint.

Treatment:—The area of the knee all round was shaved, and a thick layer of Antiphlogistine was applied and bandaged. After three applications, the swelling subsided markedly. A little pus was however seen oozing out through the narrow opening. In order to effect a free drainage, the wound was opened out and 100 c.c. of 25% of Sulphanilamide E. O. S. was injected and spread over the wound. Thereafter, the wound was daily irrigated with a warm saline for 15 minutes and then dressed with Acriflavin gauze. The part was well covered with a layer of thick cotton-wool and bandaged. There was no improvement in this treatment. Pus was flowing out more and more every day and the animal was not using its knee. It was therefore decided to treat the wound with Penicillin. 100,000 units of Penicillin in aqueous solution were used and this was continued for six days. The wound completely healed up within a week. The dressing was discontinued but the bandaging of the knee was kept up for a few days more to protect the part.

Cases of what are commonly known as 'Broken Knee' are treated differently by different authors with varying results. The use of Penicillin in such cases appears to give us more encouraging results, although the experience from one single case should be viewed with caution. The recovery of this case within a fortnight of the commencement of the treatment is however, very significant.

ASCITIS OF THE FOETUS - CAUSE OF FOETAL DYSTOKIA IN A BUFFALO

BY

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Dystokia due to ascitis of the foetus is a rare condition. In my 24 years experience, this is the first of its kind. I have met with and I would therefore like to relate my experience about it.

The subject was a she-buffalo in her third calving. She went through her full term of pregnancy and was noticed to be in pains in the early hours of 22-8-47; after a time the water-bag presented itself, ruptured after a short time, and then the fore-feet of the young one with the muzzle lying over and between them appeared at the vulva. Everything appeared to take quite a normal course, and expulsion of the foetus was thought by the owner to be only a matter of a few minutes. But, unfortunately, there was no progress for a long time. The owner, therefore, thought it desirable to effect the delivery of the foetus by traction. With the kind help of two or three of his neighbours he tried hard to pull out the foetus but met with no success. Thereupon, he decided to call me to attend on the case.

On examination, the buffaloe was found lying exhausted on her right side with a dead foetus hanging partially out of the vulva. Evidently the two front limbs and the head of the calf had been brought out with considerable difficulty. Exploration of the passage was then undertaken and it was found to be an extremely difficult task. With proper lubrication and steady manipulation, the hand was pushed along side the foetus. No abnormalities were noticed up to the end of the chest. On reaching the abdomen, it was found to be extremely tense and voluminous. The cause of the dystokia thus revealed itself as one of Ascitis of the foetus. The foetus was, therefore, retropulsed into the uterus as far as possible. In the absence of a concealed knife, a Syme's abscess knife was taken in carefully and the abdomen of the foetus was carefully punctured. Immediately, a slightly yellowish watery fluid began to flow out forcibly and the tension of the abdominal wall came to be gradually reduced. When about 3 gallons of the fluid escaped, the foetus was extracted without difficulty. The abdomen of the foetus still contained about a gallon of this fluid. The foetus was well developed and had all the attributes of a normal foetus, except that the posterior limbs were short and crooked—(*Nanomeles Compyloscelus*).

DEMODECTIC MANGE IN CALVES

By

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Six calves of the Government Dairy Farm at Khapuria, Cuttack, became affected with Demodectic Mange and these were treated with different medicaments. These are recorded in this article.

The disease was confirmed microscopically and the calves were segregated in four separate enclosures. In all the cases, the lesions were confined mostly in their order of severity, to neck, shoulder and dewlap.

1st lot :—Calf No. 13 was given Novarsenobillon intravenously. The dose was 0.15 gm. for the initial dose. Gradual increase of 0.15 gm. was given on subsequent doses. The interval between injections was 5 days. A course of five injections was given. There was improvement in general condition of the calf. Hairs began to grow on the affected parts. Still, when the materials were microscopically examined again, large numbers of demodects in their developmental stages, were seen. To avoid toxicity from N.A.B. it was decided to give rest to the animal. A second course of five injections of N.A.B. was given after a fortnight starting from 0.6 gm. The maximum concentration was 0.6 gm. in 10 c.c. of sterile distilled water. There was complete cure of the lesions. The animal was declared disease-free afterwards.

2nd lot :—Calf Nos. 14, 25 and 27 were given 3 c.c. of Acetylarsan subcutaneously on every alternate day. The strength of Acetylarsan was 0.05 gm. in 1 c.c. A course of seven injections was given to each calf with no apparent improvement. When the scrapings were examined again, they revealed mange mites. The condition of animals also did not improve. So the treatment with Acetylarsan was discontinued.

3rd lot :—Calf No. 38. Only topical application of Hydnocarpus oil with 4% Creosote was given every alternate day for a period of 2½ months. Complete recovery was effected.

4th lot :—Calf No. 68. This was given topical application and intramuscular injection of 'Hydnocreol' for a period of 1½ months at five days intervals with very satisfactory result. Condition of the calf improved to a marked degree. Hairs grew on the denuded parts of the body.

Result and observation :—Novarsenobillon is effective but its cost is prohibitive. But, in badly affected areas, especially in farm animals the cost on account of the use of the drug should not be the ruling factor. In addition to the shedding of the mangy crusts, the general condition of the animal improved with N.A.B.

Acetylsarsan was ineffective.

Topical application of Oleum Hydnocarpus with 4% Creasote is effective. It is cheap but it takes a very long time to have the desired effect.

Hydnocreol, combined intramuscular injection and topical application, is effective. It is comparatively cheaper than N. A. B. and Acetylsarsan. But where time-factor and quicker result are considered, it is not superior to N.A.B.

Finally, it is to be recorded that many calves should not be discharged as 'cured' merely by observing the general outward appearance of the crusts. A microscopical examination is necessary. It is not absolutely necessary to boil the crusts in Caustic Potash solution. The material teased with a little water on a slide reveals, on microscopic examination, the parasites.

Acknowledgement:—I wish to express my indebtedness to Mr. G. B. Singh, B.A., M.R.C.V.S., Director of Veterinary Services, Orissa, for the kind advice given in the treatment of these cases.

"HOVEN" AN EXPRESSION OF ALLERGY

By

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Adverting to the extract of the article on the above subject in the *Indian Veterinary Journal*, Vol. XXIII, No. 1 for July 1946, page 40, wherein the authors have stated that cases of Hoven in ruminants were successfully treated with one subcutaneous injection of 3 to 5 c.c. of Adrenalin without any further treatment, the following record of 16 cases treated in this dispensary will be found interesting:—

1. Case No. 753 admitted on 24-8-46. Gr. bullock, six years. Reported to be getting attacks of hoven once a week. Stomach bloated abnormally, anxious expression, difficult breathing, tongue protruded, temperature 101.4° F, bowels loose.

Treatment:—Injected Liqr. Adrenalin Tartaratus 10 c.c. subcutaneously.

Result:—Slight restlessness, flatus expelled through anus after 40 minutes. Bloating completely reduced in an hour. The animal was seen next week. The condition did not recur.

2. Case No. 800 admitted on 3-9-46. Gr. bullock, 8 years. Reported to be getting attacks of hoven once a week. Stomach bloated abnormally, anxious expression, difficult breathing, tongue protruded, temperature 101.4° F. and bowels loose.

Treatment:—Injected Liqr. Adrenalin Tartaratis 10 c.c. subcutaneously. Gave a second dose after 4 hours. No relief. Tympany persisting.

From 4-9-46 to 7-9-46, the normal remedies for Hoven like Formalin. Turpentine were tried with no success. The owner then took it home and reported it dead on the 18th.

3. Case No. 813. Ram, 3 years, admitted on 5-9-46. Ate 2 measures of cholam the previous evening. Unable to stand and was therefore carried to the dispensary. Rumen bloated to full capacity. Head down, hurried breathing, bowels constipated. Temperature 99.4° F. Lying down.

Treatment:—Liqr. Adrenalin Tartaratis 4 c.c. given subcutaneously.

Result:—30 minutes after the animal started struggling and in another 15 minutes the bloating rapidly subsided completely.

4. Case No. 866, admitted on 16-9-46. Bullock, 8 years. Animal developed the condition in the morning. Acute tympanitic condition, bowels loose, temperature 100.4° F.

Treatment.—Liqr. Adrenalin Tartaratis 5 c.c. given subcutaneously.

Result.—Condition relieved within two hours.

5. Case No. 924 admitted on 27-9-46 morning. Cow 6 years. Reported persistent tympanitic condition for a week. Rumen bloated, temperature 100.2° F bowels loose and foul smelling.

Treatment.—Gave Liqr. Adrenalin Tartaratis 10 c.c. subcutaneously another 5 c.c. after 4 hours.

Result.—Relief very delayed: condition completely relieved by evening.

6. Case No. 963 admitted on 6-10-46. Cow, 6 years. The animal was seen to 'bloat' suddenly after the morning feed. Acute tympany of the rumen, temperature 100.2° F, bowels constipated, urine scanty.

Treatment:—Liqr. Adrenalin Hydrochlor 5 c.c. injected subcutaneously. Animal relieved of the condition in an hour.

7. Case No. 1005 admitted on 16-10-46. Gr. Bullock, 8 years. Distention of the rumen since previous evening. Home treatment had been tried in vain. Condition acute, rumen bloated fully, temperature 101.4° F, bowels loose.

Treatment:—Liqr. Adrenalin Hydrochlor 5 c.c. injected subcutaneously.

Result:—Tympany slowly reduced and disappeared completely after 3 hours.

8. Case No. 1023 admitted on 20-10-46. Gr. Bullock 6 years. Tympany of two days. Condition acute, rumen bloated fully, temperature 101.4 F, bowels loose.

Treatment:—Liqr. Adrenalin Hydrochlor 5 c.c. injected subcutaneously.

Results:—Completely relieved in two days.

9. Case No. 1033 admitted on 22-10-46. bullock 7 years. Tympanitic conditions for the past 2 days. Abnormally bloated stomach. Condition very bad. Cessation of urination and defaecation, temperature 100.2 F.

Treatment:—Liqr. Adrenalin Hydrochlor 5 c.c. injected subcutaneously at 8 A.M. Repeated at 12 noon.

Result:—No appreciable change in the morning. Completely relieved by 3 P.M.

10. Case No. 1117 admitted on 9-11-46. Bullock aged. A case of recurrent tympany of the rumen. Duration 1 month.

Treatment:—10 c.c. of Liqr. Adrenalin Hydrochlor injected subcutaneously.

Result:—No relief; animal died after 2 hours.

11. Case No. 1123 admitted on 10-11-46. Cow age 4 years. Stomach was 'bloat' after the morning feed. temperature 100.2 F.

Treatment.—5 c.c. of Liqr. Adrenalin Hydrochlor given subcutaneously.

Result.—Relieved in an hour.

12. Case No. 1168 admitted on 21-11-46. Gr. bullock, 6 years. Stomach 'bloat' after the morning feed. Tympany acute, temperature 100.2 F.

Treatment.—5 c.c. of Liqr. Adrenalin Hydrochlor given subcutaneously.

Result.—Relieved in an hour.

13. Case No. 1173 admitted on 23-11-46. Bullock 8 years. Recurrent tympany on alternate days, during the past 8 days. Rumen bloated, bowels loose, urine scanty, temperature 100.6 F.

Treatment.—10 c.c. of Liqr. Adrenalin Hydrochlor subcutaneously.

Result.—Relieved in 3 hours.

14. Case No. 1183 admitted on 25-11-46. Cow, 6 years. Acute tympany, since morning anxious expression, temperature 100.4 F.

Treatment.—Injected Liqr. Adrenal in Hydrochlor 5 c.c. subcutaneously.

Result —Relieved after an hour.

15. Case No. 1263 admitted on 12-12-46. Cow, 6 years. Animal ill for the past 12 hours. Acute tympany, anxious expression, temperature 101.4 F.

Treatment.—Injected Liqr. Adrenalin Hydrochlor 5 c.c. subcutaneously.

Result.—Relieved after an hour.

16. Case No. 1509 admitted on 28-1-47. Red bullock 8 years. Sick for the past 8 days. Rumen fully bloated, bowels loose, urine scanty, temperature 100.4 F.

Treatment.—Injected Liqr Adrenalin Hydrochlor 5 c.c. subcutaneously. Repeated with 10 c.c. subcutaneously after two hours.

Result.—No relief after the first injection. Reduced in an hour after the second injection.

Conclusion.—From the above data it can be safely asserted that the treatment is very encouraging both in acute and chronic forms of the ailment. Case No. 2 and 10 did not respond to the treatment but died. Unfortunately postmortem could not be conducted on the dead animals.

In most of the cases the tympany subsided by the passage of flatus and eructation. All the animals were brought to the dispensary under instructions, for a second time, the next day, to see whether the condition recurred.

Association News

BIHAR VETERINARY ASSOCIATION

Proceedings of the Tenth Annual General Meeting held under the auspices of the Bihar Veterinary Association at the Bihar Veterinary College, Patna on the 28th, 29th, 30th, and 31st December, 1947.

First day, 28th December, 1947

The conference commenced at 2 P.M. on Sunday in the west Lecture Theatre of the Bihar Veterinary College. The chief guest Hon'ble Acharya Badrinath Verma, Minister for Education arrived exactly at 2 P.M. and was received by the President, Mr. S. K. Sen, the Secretary Mr. B. M. Prasad and members of the Reception Committee and conducted to the dais. The Chairman of the Reception Committee then garlanded him amidst great cheers from the members.

Mr. H. R. Kapur, Deputy Director, Civil Veterinary Department and the Chairman of the Reception Committee in welcoming the Hon'ble Minister and requesting him to declare the conference open made the following speech :—

Hon'ble Acharya Badrinath Verma, gentlemen and colleagues,

It is my great privilege to accord you all a most cordial welcome on behalf of the Reception Committee of this conference of the Bihar Veterinary Association. I feel grateful to the gentlemen who have responded to our invitation and found it possible to grace this occasion in the midst of their multifarious works. This augurs well for the future of the Veterinary profession. To you, my colleagues who have come from muffled stations I extend my hearty welcome. The Reception Committee has tried its best to make your stay here as convenient and comfortable as possible, but with scarcities of foodstuffs all around, you will, I am sure, make light of any slight inconveniences and take our will for the deed.

To you, Sir, (Hon'ble Acharya Badrinath Verma) I extend my welcome with profound gratitude for your readily responding to our invitation. Your presence in our midst, Sir, is a sure indication of your love to the dumb creatures which it has been our privilege to serve. The importance of cattle in the economy of the country is well known and they contribute the chief of wealth of the ryots. We must have to consider not only how to preserve this wealth but to devise also ways and means of making this wealth greater in quantity and quality. While doing so we can ill afford to ignore the status of the Veterinarians who are the custodian of his vast wealth.

Since we met last, a year ago, vital changes have taken place in our country. We are no more under bondage. The governance of our country has changed hands. To our great delight we find our own trusted leaders at the helm of affairs of the country and each province with full authority to direct the administration in the best interest of the people. Naturally our Government have given first priority to the measures intended to improve the condition of the agriculturist, and rightly so, for the very important contribution they are required to make towards food production and human nutrition. To accomplish this they depend, need we stress, mainly on the livestock. They require to be protected against diseases and also to be kept in a fit state of their health to be able to render maximum service. We aim at this. We are earnest in our efforts to achieve this objective. We are striving to prepare ourselves to shoulder the responsibility and to cope with the task that lie ahead. But our attempt necessarily remains limited to the resources at our disposal. On the otherhand, the resources of the state are unlimited. Therefore we urge, a reorientation of the policy on the part of the Government to accomodate the programme of development of the different branches of veterinary science and animal husbandry in the same priority list. The democratic outlook towards veterinary profession has been lacking in the past and this explains the reasons for the static state of our profession. This, we do not expect to continue any more in the regime of the popular Government. Our problems remain precisely the same as were enumerated by our President Mr. S. K. Sen last year. In the matter of the veterinary education we have made our wishes known to Government. We want the Bihar Veterinary College to be raised to the status of a Degree College and affiliated to the Patna University, so that the standard of efficiency is raised to the growing responsibilities awaiting a head in the field of veterinary science and animal husbandry. We want immediate introduction of the course extending over a period of four years and adoption of the syllabus prepared by the Education Committee of the Indian Council of Agricultural Research which includes veterinary science and animal husbandry and suited most to the necessities of the country. Our demand will not appear extravagant when it is remembered that most of the Veterinary Colleges in India enjoy the benefit of affiliation with Universities and are functioning as Degree Colleges. It makes us envious to see the Agricultural College of Sabour, though junior in age, functioning as a Degree College of the Patna University. The Hon'ble Minister for Development was pleased to remark favourably in his inaugural address last year. Some hopes of materialising our demand were raised by the sanction of a few post of assistants in this college. Yet we have not proceeded far from the place where we stood last year. Therefore we insist in our request and I trust you Sir, to help realisation of our aspirations as the Hon'ble Member of the Cabinet and Minister of Education.

Next our problem relates to the measures of cure and control of diseases of livestock. While we feel the need for increasing the number of Veterinary Officers and institutions to cope with this work, we feel more the need for a central institution in this province for investigating the cause and cure of many diseases which still remain obscure. Such diseases are responsible for large mortalities among livestock. The losses are indeed immense. I would therefore suggest for the earnest consideration of the government, that the staff engaged in disease investigation and in work of like nature in different laboratories of the province be organised and co-ordinated to provide a nucleus for such research institution in this province. It will then provide an opportunity for the local talents to grow and develop ultimately into a Central Research Station. This suggestion therefore deserves consideration.

We have often complained that the meagre salary offered to Veterinary Assistant Surgeons does not attract men of higher qualification to take up this profession. With the soaring prices of all commodities, the salary of the Veterinary Assistant Surgeons falls short of a living wage. This has resulted naturally in the paucity of Veterinary graduate so much so that despite re-employment of retired officers, many of the dispensaries are without a full time Veterinary Assistant Surgeon. The truth of our long standing complaint has never been brought home more vividly than this state of affairs. Yet the Bihar Pay Commission have been pleased to recommend to us very much less than that offered to our brother in the Punjab, Madras, Bombay and U. P. How far this revised scale will go to induce the right type of young men to choose this profession only future will tell. We however have no manner of doubt in our mind that even if it succeeds to increase the quantity it will fail surely to increase the quality.

The gloomy prospects in the department to which we all belong is another impediment to progress. The gloom is not due merely to the lack of opportunities for a 'lift' but also due to the fact that even the few available superior posts are "reserved" posts and not open to men with approved service.

Under such a condition even those officers who have developed efficiency by experience will naturally fail to grow despondent. I will not be surprised if they loose their heart in work also. This is no impeachment. I have mentioned the problems which confront us to day. We have to consider the solution. We seek your guidance how to approach the problems by right ways. Your presence amongst us today inspires the hope that we will have your support and blessing for all time and that we will succeed in our efforts.

The Hon'ble Acharya Badrinath Verma then declaring the conference open made the following speech in Hindi,—

Members of the Reception Committee and gentlemen,

I must first of all thank the members of the Bihar Veterinary Association for the honour they have done me in asking me to perform the inaugural ceremony of the Tenth Provincial Veterinary Conference. When I received your invitation I thought of refusing it as I do not happen to know any thing about your department and the veterinary science, but it immediately occurred to me that if I do so, I would not only disappoint you but also deprive myself of the opportunity of coming in contact with members of the veterinary profession who must be assembling here from all over the province and making a preliminary acquaintance with the methods of the working of the veterinary department and some of the pressing livestock problems. I have therefore come here to learn during my short association with you, the improved methods of cattle keeping. You should not expect from me any speech nor be surprised if you feel disappointed in not getting any assistance from me in your deliberations on technical matters. Because it is customary to say something on an occasion like this, I will just speak to you a few words.

The Chairman of the Reception Committee has expressed strong disapproval of the scale of pay recommended by the Pay Revision Committee for the Veterinary Assistant Surgeons. It also appears to me that the pay is not commensurate with the nature of the duty and responsibility attached to the work. I was also a member of the Committee and I cannot escape the responsibility of the injustice done to you. The recommendations of the Pay Revision Committee are not binding on the Government, and in fact Government have not finally accepted them. And therefore you can press your claims and I as a member of the Cabinet assure you to help you as far as lies in my power to gain your objective. (Cheers)

Cattle have a great importance in our economy of life. We need milk and need it more than other people of the world because there is a large proportion of our population which does not eat meat. It is mainly on account of inadequate milk supply that the percentage of infant mortality in India is very high and the average life of an Indian much less.

India is principally an agricultural country. More than 70 percent of its population lives on agriculture and it is no exaggeration that it is mainly on the livestock that the agriculture of the country can flourish. We therefore need strong bullocks for ploughing the land, for lifting water for irrigation and for rural transport. Unlike other countries we have in India a peculiar system of land tenure and there is no appreciable chance of mechanisation replacing the bullocks as the chief source of power for agricultural purposes.

We have therefore to depend on a dual purpose kind of animal, the males of which are capable of meeting the agricultural and transport needs of the country whilst at the same time, the females can be expected to yield reasonable quantity of milk. It has been found by experience that Punjab animals which are undoubtedly superior breeds, do not flourish in changed locality and it is therefore necessary to find out the potentialities, both in regard to milk yield and draught purposes of local cattle and improve them by judicious and selective breeding. The Veterinarians in this province have a two-fold duties to perform i.e. to produce improved and healthy cattle for better cultivation and production and good milch cows for milk purposes. You should endeavour to achieve permanent improvement. With the advance in the knowledge of animal husbandry and veterinary science, you should be able to develop breeds suited to our purposes within a reasonable short time.

I appreciate your anxiety to immediately raise the standard of veterinary education in Bihar to that of a degree course. In fact Government is seriously examining the possibilities of providing the highest training in all branches of science in this country so that many people may be trained at a time at a much lower cost and our youths may not have to go to foreign countries for such things. On going through the proceedings of your last annual general meeting it appears that my colleague Dr. Mahmud informed you that he has recommended for the affiliation of the Bihar Veterinary College to the Patna University. As he is out of station, I have not been able to contact him and know how the matter stands; but I assure you that it has not disappeared from his mind. It is possible that on account of more important State work he may not have been able to give the same amount of attention that the subject needed. I as Minister in charge of Education express my preparedness to extend help and support in the matter.

I thank you once again for the honour you have done me by inviting me to your conference and for the patience and tolerance with which you have heard me. I declare the conference open and leave you to deliberate on the important questions that confront your noble profession and take firm decision to enhance the value of the dumb cattle by application of your noble science.

After this Mr. S. K. Sen occupied the Presidential Chair amidst great applause and delivered his presidential address:—

Hon'ble A charya Badri Nath Verma and Gentlemen,

I would very much like to have spoken today to you in Hindi but I must admit that I have not yet attained sufficient proficiency in that language to enable me to address distinguished gathering like this. I am

therefore speaking in English which is, so to say, the common language of the scientist all over the world.

First of all allow me to extend my hearty welcome to you all to the 10th meeting of the Bihar Provincial Veterinary Association, a body which represents the entire veterinary profession in Bihar and also others who have joined us in our efforts to improve and preserve our livestock and to enrich the country. To those who, through the exigency of public service or for unavoidable reasons, have not been able to be present, I express my sympathy.

We are extremely grateful to Hon'ble Acharya Badri Nath Verma, Minister for Education for accepting our invitation to inaugurate the conference, inspite of his heavy engagements and important duties that he has to perform. His presence here today will enable us to apprise him of our old demand for higher education in Animal Husbandry and Veterinary Science, to which I will refer later on.

Gentlemen, in my last address I spoke on the increased responsibility which developed on us for augmenting the tempo of agricultural and food production in the New Free India. India at present is importing a large quantity of cereals and other foodstuffs from abroad at an enormous cost, and it is for us and those who are engaged in agricultural work to devise means and plans to enable people in the country to produce enough for themselves and also for export. The Department of Agriculture and Food in the Central Government, under the efficient guidance of Hon'ble Dr. Rajendra Prasad, have fully realised their responsibility in producing food and feeding India's teeming millions. Dr. Rajendra Prasad's keen interest and anxiety for the speedy development of the Animal Husbandry in this country is well known. Unless the provinces keep pace with its fast moving centre and work in collaboration and co-ordination there is bound to be dislocation and disaster in regions which are backward and not organised. Now that the period of struggle for freedom has ceased, we have entered a new era, in which construction and development must begin in all spheres of human life. Our profession will have to play an important role in the new set up of social and economical structure for the economic development of the country. I wish to warn you, Gentlemen, before hand that if we do not realise our responsibilities and hard task ahead of us and do not equip ourselves to be ready to shoulder the burden which our profession is to take, our present weak and artificial foundation will completely disappear or collapse. Main task before us is varied and many. Starting from the protection of animals from the ravages of enzootics, their maintenance in health, increasing the production of livestock commodities by 100 to 300 per cent, producing more milk, butter, ghee, eggs, poultry, meat, wool and various other protective foods and producing

more bullocks for transport and agricultural work, the modern Veterinarian has got a great obligation to discharge in the maintenance of human health and nutrition. In order to do our work more efficiently, it is necessary to raise the standard of veterinary education and training in animal husbandry in this Province. The Bihar Veterinary College which was set up in 1930 is the only College now, except Bengal which has still a three years course ending in diploma. All the old colleges in Madras, Bombay, Lahore and the new colleges in Central Provinces and U.P. have started with a degree course. At the last meeting we had an assurance from Hon'ble Dr. Syed Mahmud that the affiliation of the Veterinary College to the Patna University for raising the standard to the degree course was recommended by him and now we want to see the recommendations materialise and bear its fruit. We hope the Hon'ble Minister for Education who is entrusted by the people of this province for giving facilities for all types of education, will do his part in getting this College affiliated to the University as soon as possible.

Veterinary Education like other technical education cannot be divorced from other scientific studies. The water tight compartments created in the administration of technical institutions is harmful and detrimental to the growth and development of mutual intercourse amongst men engaged in different sciences and technology. Therefore, I feel that it is essential that subjects of pure science common to various colleges, viz. Medical, Engineering, Veterinary etc. should be taught at one place, so that students may get chance to know each other and develop a spirit of fellowship. An atmosphere for research and thirst for knowledge can only be created, if men pursuing different sciences are put together or often meet as they do, at the meetings of the Indian Science Congress. This close contact makes people realise their deficiency and the desire to improve. In this connection, I refer here to a proposal of shifting the Veterinary College from Patna to Sabour in Bhagalpur. The proposal has been made with the object of putting both Agriculture and Veterinary Colleges near each other. Although there may be some advantage in having both these two colleges situated side by side, the Veterinary Education in a place like Sabour will be incomplete without adequate hospital and clinical practice, where animal population is not so dense. Besides these beautiful buildings which were specially constructed to serve the purpose of giving veterinary training, will hardly be of any use to colleges and the cost of construction of such buildings will now be prohibitive.

The Post War Reconstruction plans of Animal Husbandry in this province have now received sanction of Government. Although the schemes are of exploratory nature and limited scope, yet it is possible to show how quickly improvement can be affected, if scientific methods are applied in Animal breeding, milk production, animal nutrition, manage-

ment of pastures, poultry development, and the development of smaller animals. The most important factors which will eventually contribute to the success of these developmental plan are joint efforts and hard work of our profession and other qualified men who are to be engaged in this task. We need a large number of qualified men for running these schemes, and for that Purpose Government have recently increased the number of admission of students from 45 to 80. The response from suitable young men of this province in regard to admission in this college has been, on the whole, very poor. The main reason for this poor response, as I told you last year, is the poor future prospects that are held out to all those who want to enter this profession. Unless the scales of pay are made more attractive, I am afraid the profession will not be able to attract suitable men. The entire outlook in the modern livestock production has completely changed and the need for scientific study of problems in animal husbandry is being felt day by day. Today the veterinarians and those engaged in animal husbandry work in India cannot stand aloof from other scientific workers. To be on the same level with others, we must recruit the best available talents and first class scientific men, like chemists, statistician, zoologists, technologists etc. for advancing our knowledge in animal nutrition, genetics, dairying, animal diseases, and associated technological studies. These men through their researches and investigations should be able to help the profession to preserve animals in health, produce more milk, increase the fertility of livestock and productivity of wool, eggs etc. Without research no development is possible in any branch of technical work. In the Veterinary and Animal Husbandry activities there is plenty of room for research and investigation. Results of research done in Europe and America cannot be accepted for application in India without verification and test. At present no research is being carried on in this College laboratory or in the Department. The Disease Investigation Officer's work is limited in scope and nature. It is desirable to recruit suitable men with bias for research and pay them well. These men can then be entrusted to solve different local problems which are of greatest importance to the country. By developmental research we mean the investigation which contemplates the verification and the benefit of the Industry or Agriculture. In India, where facilities for doing fundamental research is limited, much stress should be given to the developmental research. In order to meet, and interchange thought with research workers and eminent scientists, the Veterinarian should actively participate in gatherings like Indian Science Congress, in which there is a Veterinary and Medical Section. The Science Congress is holding its session this year in Patna and I hope many of you will stay on here to attend the Veterinary Section of the Congress.

The Pay Revision Commission, which has recently completed its most difficult task, recommended certain scales for Veterinary Surgeons, Inspectors and other higher officers. The commission's recommendations

however, fall short of the expectation of the Association. Although we fully realise that the scales of pay should be proportionate to the general standard of living and should be commensurate with the provincial revenues, we demand that the scales all over India should be more or less on a uniform basis, otherwise, the standard of efficiency will suffer. We fully appreciate the hard work the commission had to do in order to bring all posts into a limited scale of pay ensuring nationalisation and uniformity to the fullest degree possible; but I am afraid the pay offered will fail to encourage the desired type of young men to take up this profession. There is, therefore a necessity of not only increasing the scales of pay but also of prospects as well, for unlike other services the veterinary service is a specialised service, and one has to look for betterment of condition in the Veterinary department only.

I do not wish to try your patience any longer. Before I conclude, I would like to say a few words to my young friends in the profession. You have all a great responsibility to discharge and each one of you should endeavour to equip yourself by further studies and keen observations in the field so that you may be able to enhance your reputation and add to the efficiency of the service to which you belong.

I thank once again our chief guest for very kindly accepting our invitation to open the conference.

Mr. H. R. Kapur then rose to propose a vote of thanks to the chief guest and visitors and in doing so spoke as follows in Hindi :—

Hon'ble Acharya Badrinath and Gentlemen,

It gives me great pleasure to propose on behalf of the Members of the Bihar Veterinary Association, a vote of thanks to you for readily accepting our invitation and for the trouble you have taken to come here this afternoon to perform the inaugural ceremony. We all know that till yesterday you were confined to bed on account of indisposition and therefore your presence amidst us today is a testimony of your love towards the veterinary profession and it has filled us with gratitude. This is a plain truth Sir, that in these days a Veterinary Graduate is paid less than a labourer. When I say this I do not mean that I despise labour but I do think that we also should be paid adequately to keep ourselves in comfort and free from wants. This is a legitimate demand. I express my thanks to you Sir, for your promise to help us in the realisation of our aspirations. It has not yet, however, raised in us the desired amount of hope and expectation as we suffer from a sense of pessimism. Similar promises were made year after year on this very platform and in this very hall by Advisers, Ministers, Secretaries and Vice-Chancellor and yet, I feel constrained to state that we find ourselves exactly in the same place where we were before.

Therefore our only consolation is that with the dawn of a new era and with our own men at the helm of Government there is bound to come a change in the whole outlook and, before long, our profession will be placed in a position it so well deserves.

I thank the Principal, Bihar Veterinary College for allowing the use of the College building and the hostel and for his hearty co-operation.

Again on behalf of the Association I offer my thanks to you all for honouring us by your presence to day.

The day's programme ended at 4.30 p.m.

The following members of the Association attended the conference :—

1 Mr. S. K. Sen, 2 Mr. H. R. Kapur, 3 Mr. P. B. Kuppaswamy, 4 Mr. M. A. Rahim, 5 Mr. R. Y. Panday, 6 Mr. R. J. Singh, 7 Mr. B. Narayan II, 8 Mr. S. N. Sharma, 9 Mr. R. B. Singh, 10 Mr. R. D. Singh II, 11 Mr. B. N. Sinha, 12 Mr. B. M. Prasad, 13 Mr. R. B. Prasad, 14 Mr. S. A. R. Akhtar, 15 Mr. S. M. Ishaque, 16 Mr. G. Prasad, 17 Mr. R. P. Mahrotra, 18 Mr. K. D. Narain, 19 Mr. D. N. Sahai, 20 Mr. P. C. Kunar, 21 Mr. R. B. P. Sinha, 22 Mr. J. K. Singh, 23 Mr. R. L. Sinha, 24 Mr. B. Narain I, 25 Mr. B. D. Roy, 26 Mr. Tribeni Singh, 27 Mr. A. K. Mukherji, 28 Mr. S. K. Chatterji, 29 Mr. A. B. Mukherji, 30 Mr. K. L. Baxi, 31 Mr. R. P. Singh, 32 Mr. A. Lall, 33 Mr. N. D. Singh, 34 Mr. V. N. Singh, 35 Mr. K. A. Sankram, 36 Mr. S. A. Hussain, 37 Mr. V. N. P. Singh, 38 Mr. S. M. Hussain II, 39 Mr. S. M. Hussain III, 40 Mr. M. Naimuddin, 41 Mr. Q. Khan, 42 Mr. A. K. Varma, 43 Mr. H. D. Afgani, 44 Mr. R. K. Singh, 45 Mr. N. S. Sinha, 46 Mr. N. S. S. Varma, 47 Mr. S. Huda, 48 Mr. S. M. Moosa, 49 Mr. S. Mohammad, 50 Mr. R. K. Ram, 51 Mr. R. N. Singh, 52 Mr. K. P. Jaiswal, 53 Mr. B. P. Varma, 54 Mr. B. Dey, 55 Mr. H. K. Roy, 56 Mr. R. N. Chaudhury, 57 Mr. J. P. Singh, 58 Mr. R. C. S. C. Prasad, 59 Mr. R. R. Sinha, 60 Mr. S. S. Ahmad, 61 Mr. H. Prasad, 62 Mr. Deobans Prasad, 63 Mr. R. A. Prasad, 64 Mr. Chatturbhu Sinha.

Telegrams and letters were received from several members regretting their inability to attend the meeting and wishing success for the conference.

The conference was attended by some distinguished persons of the city and also by the staff and students of the Bihar Veterinary College.

Second day 29th December, 1947

The second day's proceedings commenced at 9 A. M. with Mr. S. K. Sen in the chair. The Secretary presented his report for the period from 2nd January to 28th December, 47, for discussion and adoption. The report read as follows:

The report of the Association which I have the pleasure to present covers the period from 2nd January, 1947 up to date.

This is the first time after India attained freedom that our Association is holding its annual general meeting. This is a great occasion for us all and let us all rejoice over it.

After the last annual conference, during the period under report, the Managing Committee met five times. At times it was necessary to meet at short notice to take quick decision over matters which directly concerned the interest of the profession and of the members who form its back bone.

In narrating some of the most important activities of the Association, I would request you all to refer to the resolutions passed at the last general meeting without which it would not be possible to review them properly. You all must also be eager to know the actions taken in regard to them.

All the resolutions were forwarded to Government with explanatory notes in due course. In resolution No. II, Government were moved to accept the amended by-laws of the association. After reminders were sent by me to Government, the Secretary for Development called me to his office in the first week of this month for discussion on the new bye-laws. He desired to know the means the association would provide for the advancement of Animal Husbandry and Veterinary Science and arts; and necessity of extending the membership of the association to persons with a light qualifications of the Animal Husbandry Department. Both these points were explained by me and no further discussion took place. I was expecting a letter of government approval but surprisingly enough, the Secretary in his last letter on the subject desires me to re-draft some of the rules and resubmit the new bye-laws. I have since requested him to suggest amendment which he has in mind, to enable me to place the same before the general body as nothing was pointed out to me in the course of the discussion. Although I have informed him of the dates of the conference, no reply has been received as yet.

In regard to resolution No. IV, urging Government to prescribe the interim time scale of pay according to the length of service of individual members, repeated requests were made to Government for immediate consideration and orders. The subject was also discussed in the first committee meeting and according to the decision taken in that meeting a deputation of several members waited upon the Hon'ble Minister for Finance who gave us a patient hearing and promised to look into the matter. He also desired us to furnish him with a copy of our letter to the Development Minister forwarded along with the resolution. This was done but up till now nothing is known. I also saw the Deputy Secretary of Finance in this connection but that also has not been of any help. While the Finance Minister readily agreed to hear us, I regret to

have to say that all our attempts to see the Hon'ble Minister for Development in connection with the same subject failed; since every time, I approached the private secretary with the request to fix some time to receive the deputationists the only reply was that the Hon'ble Minister was occupied in some more important work. In a similar manner we failed to see the Hon'ble Premier and therefore I am not in a position to say anything further on the subject.

In resolution No. VII, the Government were moved to designate the present Veterinary Inspectors as District Veterinary Officers and place them in Class II service. The question is under their consideration and in the meantime the Government desired us to let them know what actions are being taken by other provinces in the matter. All the provinces have been addressed and their reply is awaited. The Director, Veterinary Services, Bihar has also been furnished with a copy of relevant extract from the recommendations of Royal Commission on Agriculture in India (1928) in connection with the above.

In resolution No. VIII we demanded abolition of the professional examination and am glad to announce, although most of you must now be knowing it, that the Government have been pleased to abolish the quinquennial professional examination of Veterinary Inspectors and Veterinary Assistant Surgeons.

In resolution No. IX, we moved the Government to replace the present fixed T. A. by general system of Travelling Allowance. The government wanted detailed informations as to the rate obtaining in other provinces in India. Necessary information has been collected and furnished. I also discussed the matter with the Under Secretary, Development and have reason to believe that our prayer will receive their sympathetic consideration and a decision may be available soon.

According to resolution No. XII, the Executive Committee selected the President and the Secretary to represent the Association to the Pay Revision Committee. The representatives met the Committee on 10th Sept. 47 and placed before them the whole case in an appealing manner. Their recommendations are contained in the report which came out on the 22nd Nov. 47. In an extraordinary meeting of the Executive Committee, the report was considered, modifications were suggested and anomalies pointed out, after a thorough discussion and concurrence of the members present. Every member of the Association has been supplied with a copy of both. (Pay Revision Committee's recommendations and Association's modification) for his information.

In resolution No. V, passed in the Committee meeting held on the 15th Oct. 47, it was decided to wait upon a deputation on the Development Secretary and the Director, Veterinary Services to impress upon them the necessity of forwarding the applications of suitably qualified persons of this Department for any better post in the province. The necessity of this resolution arose from the

fact that recently two posts of Livestock inspectors in the scale of Rs. 125-9-170 were advertised by the Animal Husbandry Department and some members of the Association possessing requisite qualifications applied. But their applications, it seems, were held up by the Department, presumably on the ground of shortage of staff. Accordingly a deputation waited upon the Secretary, Development on the 10th Dec. 47, and appraised him of the urgency of the situation and offered constructive proposals to meet the emergency. The Secretary appreciated our demand as just and promised to communicate his decision before the 20th of Dec. 47. I rang him up on the 19th and was told that he had not come to any decision then but thought to arrive at some decision by 22nd Dec. positively. I have since tried to get him on the phone but he is out of station and nothing is known in the matter as yet. The Director, Veterinary Services, has considered it fit to keep silent over the point for reasons best known to him.

Other resolutions are pending with the government. In addition to these most important and vital subjects the Association during the period under report, passed many other resolutions and suitable actions were taken in all cases. To quote only one, the Committee in their meeting held on 25th Nov. 47, considered about the vacancy in the post of the Resident Surgeon, attached to the Bihar Veterinary College, consequent on the resignation of Mr. A. A. Khan, and lost no time in requesting the government to fill it by promotion of a senior men from the Department, as is usually done in the appointment of Veterinary Inspectors.

Besides these, the Association has tried to keep itself in touch with the activities of other similar organisation.

I along with Mr. Kuppuswamy attended a meeting of the representatives of the provincial service association on the 3rd. Dec. 47, convened for the purpose of examining the possibilities of starting a provincial service federation to guard the common interest of officers belonging to the provincial service. I placed the subject before the Executive Committee meeting to consider the desirability of our Association, which represents the interest of all three classes of service, joining the federation. The committee decided to set aside the question at present.

I attended another meeting of the representatives of all service Association held on the 10th Dec. 47, organised under the auspices of the Secretariat Ministerial Association, to make recommendation to government both in respect of pay and dearness allowance as an interim relief, to all Government servants, pending finalisation of the recommendations of the Pay Revision Committee. I have not incorporated the draft resolution in my present report but it is available for scrutiny by the members.

Resolution No. V, brings me to the vexed question of payment of subscription by members. The energy of the members of the Executive Committee

and expenditure involved in formulating methods for realisation of dues, could be very well utilised in more useful directions in advancing the cause of the Association if all the members develop the desire to make prompt settlement. At least 5 or 6 appeals and reminders have been issued at a cost of Rs. 50/- but the response has not been to our expectations. There are several defaulters still as will appear from a list that is hung up on the notice board. The annual subscription should be considered as an annual premium for a service bonus and paid up at the very first call.

Last year, we considered ourselves fortunate as the Hon'ble Minister for Development in his inaugural address assured us of his best endeavour to sympathetically consider all our proposals. His assurance raised in us high hopes and great expectations but I am so sorry to have to say that the authorities do not appear to have been able to take encouraging steps and consider our proposal with the speed they deserve on account of urgency. The Hon'ble Minister also said that as interim measure to accelerate the pace of progress "Salhoutries" should be given training for five to six months by the Veterinary Department so that they may be in a position to perform vaccination and other minor treatment of animals without doing harm to them. He invited suggestion from the Association when the scheme was ready for examination. I understand, that a scheme has already been drawn up and the first batch of trainees selected. If the Association was given the opportunity to express its views on the scheme, it would certainly have offered some constructive suggestions and helpful criticisms. The Association does not know the detail of its working, but from the little information it has been able to gather, if true, the scheme is likely to uncompromise the status of the Veterinarians and the objective for which it has been initiated will remain unfulfilled.

In conclusion, I would like to say from my experience that the Association will have to face many difficulties at every stage of its progress, but I assure you all that it will be able to survive, all the blasts of adversity and maintain its identities and usefulness, if it continues to get your full co-operation in its struggle for the just cause.

I think I shall be failing in my duty if I do not express my thanks to the members of the Executive Committee for their ungrudging help in the discharge of my duties. To the President, I am specially indebted for his wise counsel and able guidance whenever sought.

I hope you will forgive me my short-comings if any in my capacity as Secretary.

The following is the statement of income and expenditure for the year 1947 duly audited by Mr. H. K. Roy.

The conference re-assembled at 2 P. M. The election of the office beares and members of the Excutive Committee for the new year then took place. Mr. S. K. Sen having tendered his resignation a month back on account of pressure of official work in the newly started Animal Husbandry Department, Mr. H. R. Kapur was unanimously elected as the President for the year 1948.

The following were elected to the various posts by majority of votes :—

Mr. H. R. Kapur—*President*
Mr. Q. Khan—*Vice-President*
Mr. B. M. Prasad—*General Secretary*
Mr. K. S. Sankaran—*Joint Secretary*
Mr. B. N. Sinha—*Treasurer*
Mr. R. B. Prasad, }
Mr. P. C. Kunar, } *Members*
Mr G. Prasad, }
Mr. A. K. Varma, }
Mr. H. K. Roy—*Auditor*

The business terminated with a vote of hearty thanks to the outgoing President. After this all the members paid a visit to the stall of MAY & BAKER and spent sometime there.

4th Day 31st December, 1947

The 4th Day's proceedings commenced with the a practical demonstration of the efficacy of "Intraval Sodium" (Soluble Thiopentone B. P.) as a short duration anesthetic for dogs, by B. M. Prasad of the Bihar Veterinary College. The drug was supplied by the manufacturers—MAY & BAKER as free sample. After this the gathering assembled in the college hall with Mr. Sen in the chair and spent the morning in discussion on professional subjects.

1. Mr. P. B. Kuppuswamy, D.I.C., Bihar gave an interesting discourse on the treatment and prevention of common helminthic infestations of the domesticated animals in Bihar.

2. Mr. R. B. Prasad, read a paper on "Bovine Mastitis" which was based on his personal observations in regard to incidence, methods of diagnosis of both latent and clinical forms, treatment and prevention, in many hundreds of cases encountered during the course of investigation under the Mastitis Scheme. The lecture was very interesting.

3. Mr. R. L. Malhotra read a paper on "The Utility Cattle Breeding Problems of rural Bihar".

All the members present evinced great interest and spent a busy morning. The meeting dispersed at 1 P. M.

In the afternoon a group photograph of the members was taken and all of them were treated to a tea party in the common room of the Post Graduate Hostel.

RESOLUTIONS

Resolutions passed at the tenth annual general meeting of the Bihar Veterinary Association held on 30-12-47.

1. This meeting places on record its sense of profound sorrow at the passing away of the late Babu N. N. Ghosh.
2. Resolved that Government be moved to institute a Board for Selection of candidates for training abroad and in India in Veterinary and Animal Husbandry science. The Board should contain besides others; the Hon'ble Member, Head of the Department, one representative of the Association and an expert in the subject. Every officer, irrespective of age and period of service, should be allowed to compete.
3. Resolved that Government be moved to provide all the Veterinary Hospitals with a compounder and every dispensary with a dresser.
4. Resolved that Government be moved to provide all the Veterinary Hospitals with a microscope and other necessary equipment for quick diagnosis.
5. Resolved that Government be moved to bring into force with immediate effect the practice of co-opting a veterinary officer to attend the meetings of the District Boards and Local Bodies.
6. Resolved that Government be moved to change the designation of Veterinary Assistant Surgeon and Touring Veterinary Assistant Surgeon to Veterinary Surgeon and give all facilities to the latter at present enjoyed by officers in charge of veterinary hospitals.
7. Resolved that since the present inflation has increased the cost of living and treatment, the rules governing the scale of fees laid down in the Civil Veterinary Department manual, should be abolished. The members of the Association are expected to charge reasonably as professional fees.
8. Resolved that the following be added to the duties of the Secretary and the bye-laws amended,

"He can approach any person, official or non-official and discuss matters in connection with the development and progress of the Association. He is empowered to grant press interviews and issue press statements in the interest of the Association."

9. Resolved that Government be moved to request the authorities concerned to allow free occupation of the P.W.D. and D. B. Inspection Bungalow to all veterinary officers, gazetted or non-gazetted, when on public duty.
10. Resolved that in order to enable the Veterinary Inspectors to devote more time towards professional work, they should be provided with a clerk to carry on the office work which keeps the officers hard pressed.
11. This Association take note of the advertisement made by the Bihar Government through the Joint Public Service Commission for the post of Deputy Director in class I Bihar Veterinary Service and regret to observe that the terms of advertisement entirely exclude the veterinary graduates of the Indian Colleges. This, the Association feels is not justifiable in view of the fact that such graduates have held this post successfully in this province and also in view of the conditions obtaining in other provinces of India, wherein

Veterinary Graduates of Indian Veterinary Colleges have held and are at present holding not only similar posts but also the posts of Director, Veterinary Services and Principal of Veterinary College. It is therefore "Resolved that Government be requested to reconsider the terms of advertisement and make suitable modifications to make the Graduates of Indian Veterinary Colleges, eligible to apply for the post."

12. Resolved that as in some other provinces in India, all gazetted posts in the Civil Veterinary and Animal Husbandary Departments in this province should be filled in by people of the province through the medium of the Public Service Commission.

Bihar Veterinary College.
PATNA.

B. M. PRASAD,
Secretary,
Bihar Veterinary Association.

BIRBHUM DISTRICT VETERINARY CONFERENCE.

Proceedings of the Birbhum District Veterinary Conference held at the Sadar Veterinary Hospital at Suri, on the 26th February 1948 at 11 a.m.

Members present:—Messrs. N. C. Biswas, J. P. Sen, A. N. Guha, H. K. Sen, B. M. Sen, A. N. Choudhury and S. M. Dhar.

Mr. N. C. Biswas was voted to the chair.

The proceedings commenced with observation of two minutes silence, in memory of Mahatma Gandiji.

1. Confirmed the proceedings of the last meeting of the Birbhum District Veterinary Conference, held on 18-1-48 at Suri.

2. Mr. S. M. Dhar, District Veterinary Officer, Birbhum, informed the members that as resolved in resolution No. 5 of the Birbhum District Veterinary Conference held on 18-1-48, orders had been placed for the following journals for Birbhum Veterinarians—the Indian Journal of Veterinary Science and Animal Husbandry, Indian Farming, Indian Veterinary Journal and Indian Poultry Gazette.

3. Resolved to fix the annual subscription at Rs. 4/—(instead of at Rs. 6 as decided on 18-1-48) and to request the members to pay the amount in advance.

4. Resolved to hold the next meeting in Rampurhat sub-division and to request the District Veterinary Officer to fix the date and time of the meeting and intimate the members in time.

5. Resolved to forward the resolutions to the press (Amrit Bazaar, Hindusthan Standard and to the Indian Veterinary Journal.)

In addition to the above resolutions, an informal discussion on various matters of professional interest, especially on Sterility in cows, took place in which a number of Veterinary Assistant Surgeons joined. Some practical

With a vote of thanks to the Chair, the gathering dispersed.

N. C. BISWAS,
Veterinary Assistant Surgeon, Suri,
Chairman.

College News

**List in order of merit of the Students who have passed the
Diploma Examination of the Bengal Veterinary College
during the session 1947-48.**

- | | |
|--------------------------------------|--------------------------------------|
| 1. S. M. Abbas, U. P. (Govt) | 21. R. K. Thapliyal, U. P. (Govt) |
| 2. G. D. Das. (Baster Stree) | 22. G. B. Mandal, Bengal |
| 3. H. G. Sen. Bengal | 23. { Md. Jainuddin Bengal |
| 4. R. K. Sundram, Bengal | { Md. Wasi, U. P. (Govt) |
| 5. Md. S. Ahmed, Assam (Govt) | 24. W. J. Hool, Ceylon |
| 6. S. K. Pramanik, Bengal | 25. A. K. Acherjee, Bengal |
| 7. K. P. Srinivastava, U. P. (Govt) | 26. A. K. G. Mahiuddin, Bengal |
| 8. S. S. Majumdar, Bengal | 27. S. N. Sen Gupta, Bengal |
| 9. { B. B. Misra, Orissa (Govt) | 28. P. K. Mookherjee, Bengal |
| { K. N. Banerjee, Bengal | 29. S. C. Misra, Orissa (Govt) |
| 10. A. M. Quarshi, Hyderabad (State) | 30. { D. K. Roy, Bengal |
| 11. T. P. Singh Varma, U.P. (Govt) | { J. C. Shome, Assam (Govt) |
| 12. B. B. Bhattacharjee, (Bengal) | 31. G. P. Srinivastava, U. P. (Govt) |
| 13. { N. B. Mukherjee, Bengal. | 32. N. M. Lingu Gouda, Mysore |
| { S. D. P. Kala, U. P. (Govt) | (State) |
| 14. J. L. Roy, Bengal. | 33. S. Saha, Bengal |
| 15. G. N. Gangana, Mysore (State) | 34. { N. P. Saha, Bengal |
| 16. K. K. Mukherjee, Orissa (Govt) | { S. N. Neogi, Bengal |
| 17. S. K. Sinha, Bengal | 35. K. Lall, Alwar (State) |
| 18. R. Madhusudan, Hyderabad | 36. J. N. Ganguli, Bengal |
| (State) | 37. G. P. Dey, Bengal |
| 19. P. C. Roy, Bengal | 38. { K. Ballav, U. P. (Govt) |
| { S. P. V. Narshu, Orissa (Govt) | { S. C. Bara. Assam (Govt) |
| 20. { D. D. Ghose, Bengal | 39. G. C. Bag, Bengal |

*Principal,
Bengal Veterinary College.*

BIHAR VETERINARY COLLEGE, PATNA

List of successful final year (Diploma Examination) students according to merit.

Sl. No.	Name	Name of Government or District Board etc.
1.	S. P. S. Choudhry	U. P. Government
2.	Dawar Hussain	"
3.	Rameshwar Dayal }	"
4.	B. N. Choudhury }	Bihar Private
5.	Dhanajai Pd. Asthana }	U. P. Government
6.	Mahatma Singh }	"
7.	Ahmed Hussain	"
8.	N. L. Sharma	"
9.	U. S. Srinivasatava	"
10.	C. H. W. Perera	Ceylon Government
11.	G. Brave }	U. P. Government
12.	P. P. Bisi }	Orissa "
13.	N. R. V. Rao	Hyderabad
14.	Sami Ahmad Khan	U. P. Government
15.	S. Mahmed Ali	Bettiah Raj
16.	S. A. Quasim	Jaipore State
17.	Shiva Shankar Mishra }	Bihar Private
18.	Sita Ram Singh }	"
19.	A. Ballabh	U. P. Government
20.	Zainuddin Zuberi	"
21.	Jai Bhagwan Sharma	"
22.	J. S. Michael	Mysore State
23.	A. N. Duivedi	U. P. Government
24.	Surendra Sinhe	Patna D. B.
25.	Rasik Behari Sinha	U. P. Government
26.	G. S. Negi	"

Patna (Bihar), }
28th April, 1948, }

S. K. SEN, B.Sc., M.R.C.V.S.,
Principal.

MADRAS VETERINARY COLLEGE

The following candidates have passed the Final Diploma Examination of the Madras Veterinary College, held in March, 1948.

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|-------------------------------|------------------------------|
| 1. Balagopal, P.N. | 15. Ramakrishnan, R. |
| 2. Balasubramanian, P. | 16. Ramachandra Reddi, K. |
| 3. Birendra Bahadur Singh. | 17. Ramaswamy, C. N. |
| 4. Ganesh Prasad Singh. | 18. Sankaran Nayar, K. |
| 5. Jayaraman, S. (Sivaraman) | 19. Sitaramamurthi, D. |
| 6. Jayaraman, S. (Sivasankar) | 20. Sivaraman, T. |
| 7. Krishnamurthi Rao, T. V. | 21. Sriramurthi, V. |
| 8. Krishnan, R. | 22. Subba Rao, N. |
| 9. Krishnan, T. | 23. Sundarapariipooranam, A. |
| 10. Lakshminarasimhan, A. | 24. Swaminathan, M. A. |
| 11. Padmanabha Rao, S. | 25. Venkataraman, R. |
| 12. Papayya, G. | 26. Venkataramanmurthi, K. |
| 13. Parasuraman, A. | 27. Viraraghavan, A. V. |
| 14. Rama Rao, T. | |

Madras
2-4-48

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S. VAIDYANATHA MUDALIAR, G.M.V.C.
Principal.

Correspondence

Sir,

Wastage of straw

Regarding the letter on the above subject by Mr. R. L. Malhotra in Vol. XXIV, No. 4 of the *Indian Veterinary Journal*, there can be no diversity of opinion about the fact that the huge amount of straw—tons and tons of it—should not be wasted but should be utilised as cattle feed. But I do not agree with the correspondent in his suggestions to prevent the wastage.

It is very easy to suggest tiles and corrugated sheets for roofing, but, then, how is the farmer to get at these articles in these days of high cost and strict controls? What, however, should be the correct approach to the question is to educate the farmer on the economic use of the straw, and especially the Alkali-treated straw, with great advantage and benefit to his cattle. At present, the farmer does not know anything about the nutritive values of the treated straw and therefore it should be the duty of the Veterinary Surgeons to popularise it by practical demonstrations even in remote villages. Local Bodies and Panchayats should be induced to undertake this propaganda. When once the ryot is convinced of this method of feeding the straw, he will soon take to it with zeal and then there will be neither superfluous straw nor wastage of it. This is my suggestion to prevent wastage.

Parola, E. Khandesh Dt.
15th March 1948.

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V. NARAIN NAVANGUL, G.B.V.C., P.G.,
Veterinary Assistant Surgeon.

